August 9, 1943

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

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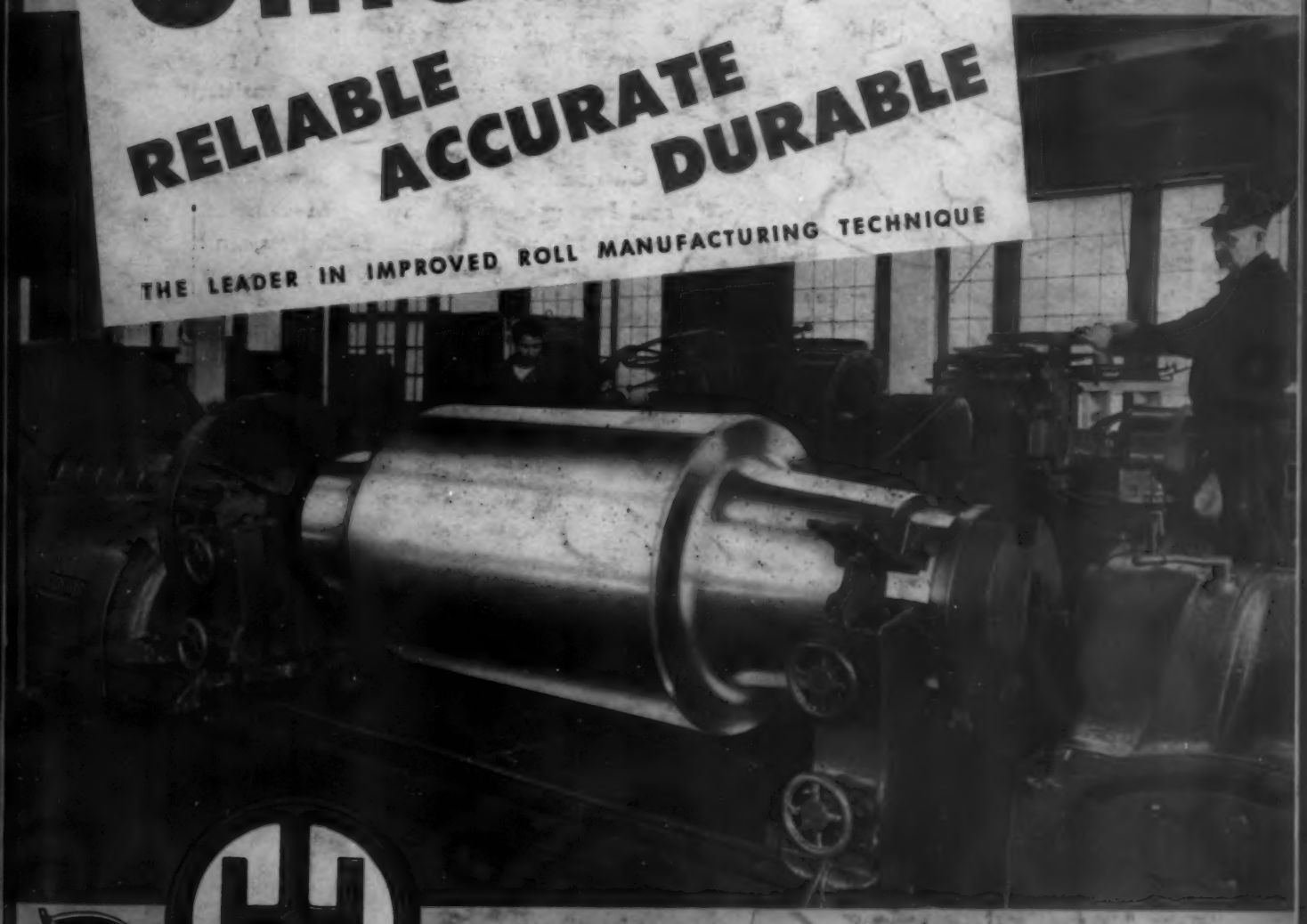
DETROIT

TECHNOLOGY DEPT.

OHIO ROLLS

RELIABLE
ACCURATE
DURABLE

THE LEADER IN IMPROVED ROLL MANUFACTURING TECHNIQUE



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THE OHIO STEEL FOUNDRY COMPANY

LIMA AND SPRINGFIELD, OHIO

ENGINEERS • FOUNDERS • MACHINISTS

FREE ENTERPRISE IS THE ONLY WAY TO CONSTANTLY HIGHER AMERICAN LIVING STANDARDS

Consistent Results in WELDING

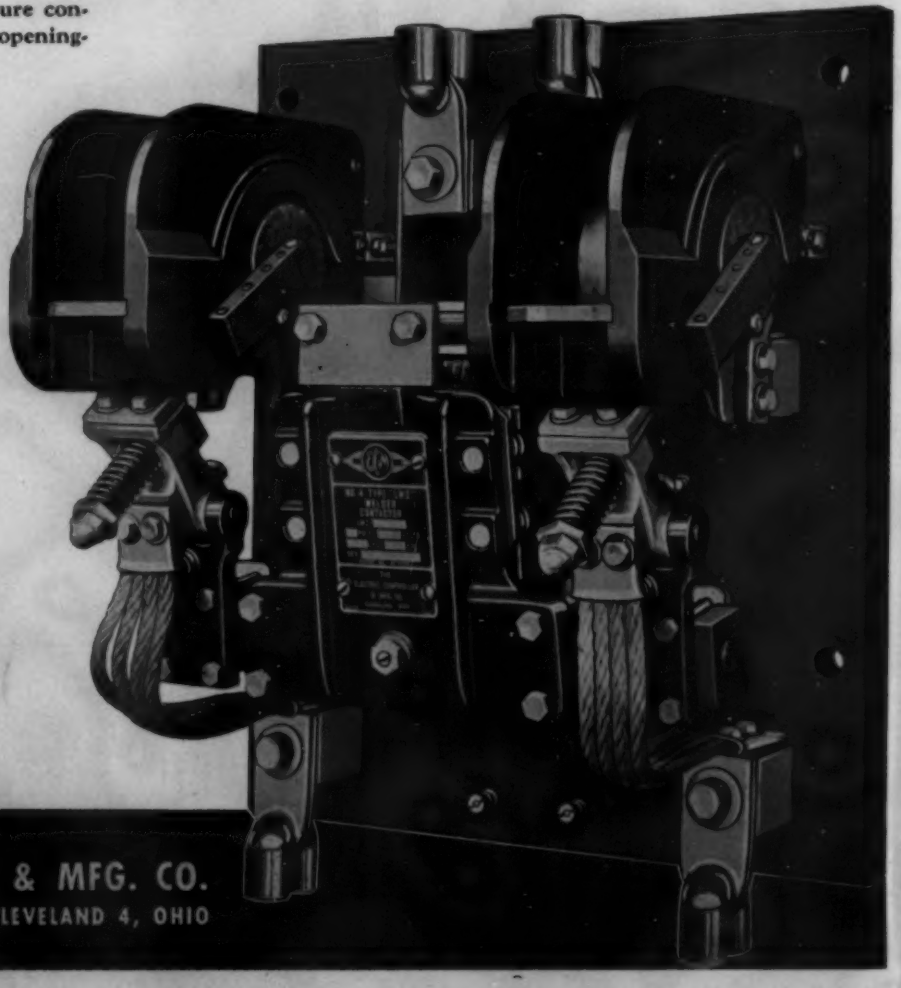
CONVENIENT ADJUSTMENT COMPENSATES FOR WEAR AND PERMITS HIGH-SPEED, UNIFORM OPENING

This single adjustment is easy to make and requires only the simplest tools. Any operator can make it and thereby insure consistent welding results by keeping opening-time uniform.

THESE *heavy-duty* LWZ Magnetic Contactors insure good welds at low cost. They are not an adaptation of a standard contactor but are designed especially for *welding service.* They have a readily accessible contact-adjustment which permits high-speed, uniform opening, giving consistent welding results.

Outstanding due to their high arc-handling ability and low upkeep, these EC&M Contactors are unmatched in performance. Deliveries can be made in reasonably good time. Ask for Bulletin 1211.

We build six standard sizes of welder contactors. At the right is the No. 4W size. Ratings are based on duty cycle curves as shown in Bulletin 1211.



THE ELECTRIC CONTROLLER & MFG. CO.
2698 E. 79th STREET ★ CLEVELAND 4, OHIO

TECHNOLOGY DEPT

Cool, clean air for sea fighters

A modern battleship is a giant steel honeycomb, crammed with complicated piping, myriads of electrical cables, huge boilers, turbines, equipment of every sort.

Men move in this labyrinth through shoulder-wide access hatches, along corridors so cramped that two men can scarcely pass. Many stations are buried deep in the center of the mammoth armor-plated hull. Cool, fresh, clean air must be continuously fed to every man on a battlewagon if he is to do his job efficiently.

Here's where Bethlehem Galvanized Steel Sheets are now at work—thousands of tons of them—in battleships, carriers, cruisers and destroyers. Sheet steel goes into air ducts by the mile—as well as into bulkheads, safety doors, galley equipment; it handles dozens of jobs which are vital to the efficient functioning of vessel and crew. Sheet steel is definitely a key material in our rapidly expanding Navy, and in the swiftly growing fleet of cargo vessels which supports fighting Americans on distant battlefronts.

BETHLEHEM STEEL

BETHLEHEM STEEL SHEETS

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS BRAKES SHEARS

Shaping a 10,000 lb. Plate

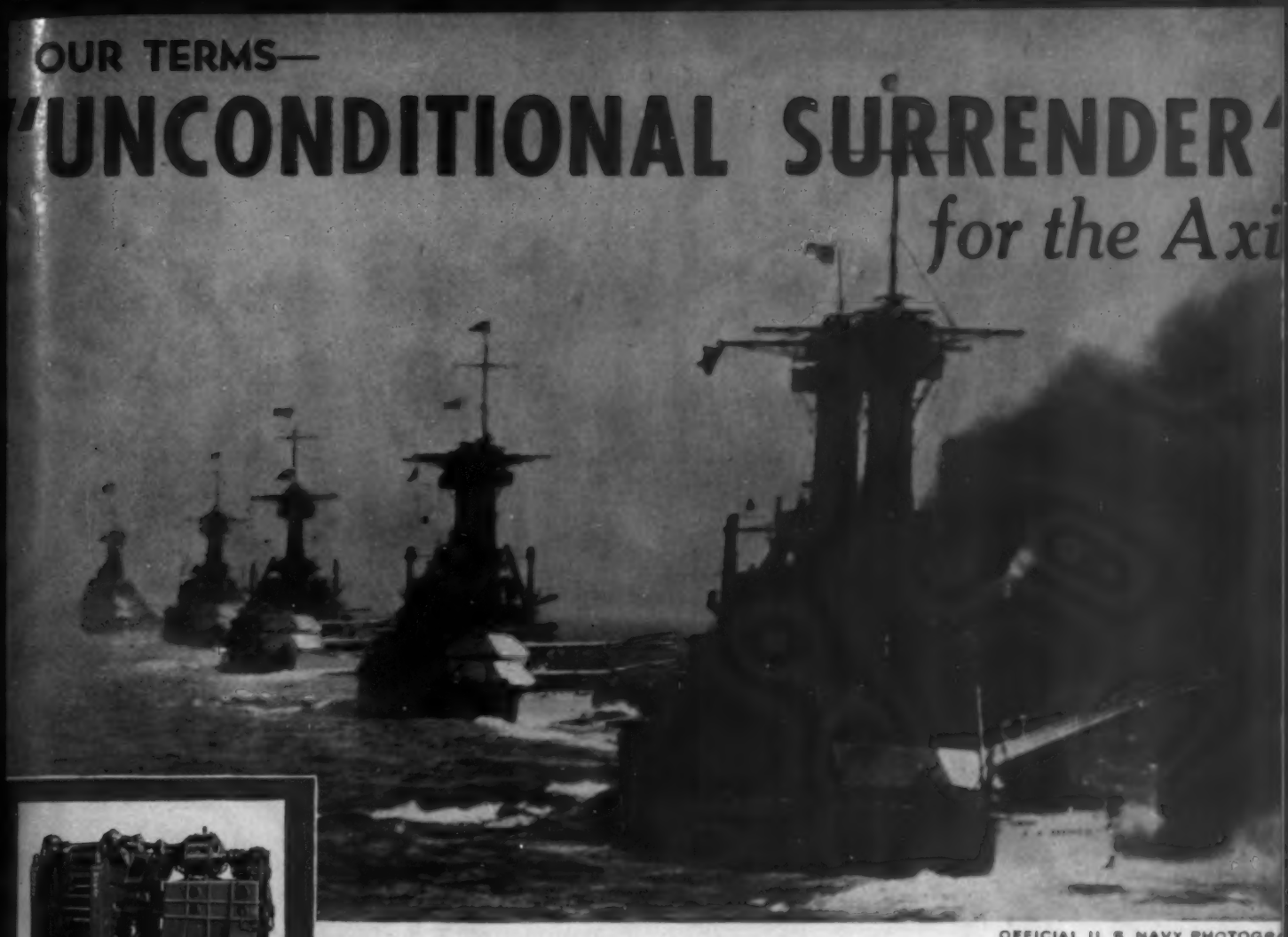
The Shaper is recognized as indispensable in the toolroom—but many manufacturing jobs are best performed on Shapers. Whether shaping slots in a 10,000-lb. plate or contouring small parts, the power and accuracy of Cincinnati Shapers will meet your requirements.

Write for Calalog N-2

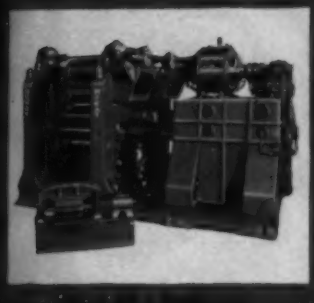
OUR TERMS—

"UNCONDITIONAL SURRENDER"

for the Axi



OFFICIAL U S NAVY PHOTOGRA



The Allied planes that fly through battle skies; the ships that sail the perilous seas; the tanks lumbering over trackless ways that lead to Axis strongholds, and every gun and weapon that "rains a deadly dew" upon the enemies of freedom, are hounds of vengeance unleashed by liberty loving peoples to hunt out the enemy and avenge his evil deeds. Hounds of vengeance that will not be called off until the day of "unconditional surrender."

Now, The McKay Machine Company's entire facilities are devoted to producing machines that help to form these hounds of vengeance. But when war days are over, these same machines will be helping manufacturers make better products for better living.

THE McKAY MACHINE CO.

Engineers and Manufacturers of

SHEET, TIN AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

We also build: TUBE DRAWBENCHES, BAR SHEARS and ROTARY POINTER

"SOLD BY THE WEAN ENGINEERING CO., INC., WARREN, O."

BEHIND THE SCENES

Research in Pipe Fluids

■ Among our clientele there are undoubtedly many pipe smokers—all the way from the professionals whose faces look empty without one, to the guys in our class who periodically take up pipe smoking "to cut down on cigarettes." At the same time it is rumored among the smart buyers of advertising space that this weekly magazine of metalworking and metalproducing is read by quite a gang of very capable engineers. Assuming you fall in both classifications, we're sure you'll find the following technical paper on "The Flow of Fluids Through Tobacco Pipes" both stimulating and educational. Coming as it does from "Cranews," published by the Crane Co. up in Canada we guarantee its authoritativeness.

Many empirical formulas have been proposed for the problem of flow of juices in tobacco pipes, but these are often extremely limited and can be applied only when the conditions of the problem closely approach the conditions of the experiments from which my formulas were derived. These are rather complicated and, therefore, are not included herein. One variable in these formulas, the "Spitz" factor, however, must be determined experimentally.

Viscous and Turbulent Flow

By performing a simple experiment it can readily be shown that there are three entirely different types of flow in pipes. The experiment consists of injecting various types of tobacco in the pipe. If a high grade mixture is used, the flow is viscous, or streamlined. A cheap brand on the other hand produces a critical flow, but if Tabac Canadien is injected, the flow is turbulent, which is too bad. Even though a turbulent mixture exists throughout the greater portion of the pipe diameter, there is always a laminar sub-layer of fluid at the pipe wall which is moving in viscous flow and possibly may save the life of the experimenter.

Friction

Flow in pipes is always accompanied by friction (domestic) and consequently, by loss of energy in work. Energy lost in friction is converted into heat energy. The heat thus produced may be entirely absorbed by the fluid (if the fuel is Tabac Canadien) producing adiabatic flow, in which extreme case the wife goes home to mother, or it may be entirely dissipated through the pipe walls (isothermal flow) in which case she merely sniffs.

The Pipe Diameter

The internal diameter of the pipe in which flow is taking place influences to a great extent the friction loss of breath per foot of pipe. For a given rate of flow ("Spitz") the pressure drop per foot of pipe varies perversely with the fifth power of the diameter. Since the interior of pipes in service usually become coated with scale, dirt, tubercules, and goo, it is often prudent to make allowance for expected diameter changes, or otherwise to use a pipe cleaner.

Flow in Bends and Elbows

The nature of the flow in bends has been thoroughly investigated and many interesting facts have been discovered except why smokers used curve pipes. For example: when the fluid passes around a bend in either viscous or turbulent flow, there is established in the bend a secondary flow. This is rotating motion, at right angles to the pipe axis and probably is the reason why curved pipe smokers get dizzy!

STEEL on the Air

■ STEEL was on the air the week before last over WJAS, Pittsburgh, in the person of Pittsburgh Editor Bob Hartford. Along with George P. Thomas, president, Thomas Machine Manufacturing Co., and several workers in the Thomas plant, Bob did a swell job in a discussion of machine tool and other war production work being done by Mr. Thomas's organization. The program was one of a series on Pittsburgh War Industries presented by the Pittsburgh Chamber of Commerce.

We'll Be Careful

■ We undoubtedly deserve the terrific lashing delivered by C. W. Kujak, purchasing agent, F. P. Smith Wire & Iron Works, Chicago, the other day for running in that old timer in the July 19 issue about the salesmen, the engineers, and the purchasing agents. He says:

> **Before me is a card with the identical wording, and this was handed to me over fifteen years ago. Must be that some things never die a natural death, but hope now it finally has been buried for good.**
>
> **All in all, STEEL has been a good magazine, like it very much, just had to get this off my chest.**

All of which brings us face to face with A. Lincoln's famous statement about fooling the people.

The Postwar Hearse

■ Art Allen's special report on The Postwar Automobile has caused a lot of comment, resulted in a stack of requests for reprints, and clearly shown the interest in the products of tomorrow. But nowhere to our knowledge has this swell piece of analysis been of such direct influence as with the A. J. Miller Co., Bellefontaine, Ohio, manufacturers of funeral cars and ambulances. After reading The Postwar Automobile in STEEL they immediately got in touch with George Walker, the well-known Detroit designer, who delivered a design for a postwar funeral car, which, to say the least, is a knock-out. You can currently find it advertised in the various funeral magazines with the provision that the purchase of war bonds now, carries with it the option of ordering one of the new streamliners after the war.

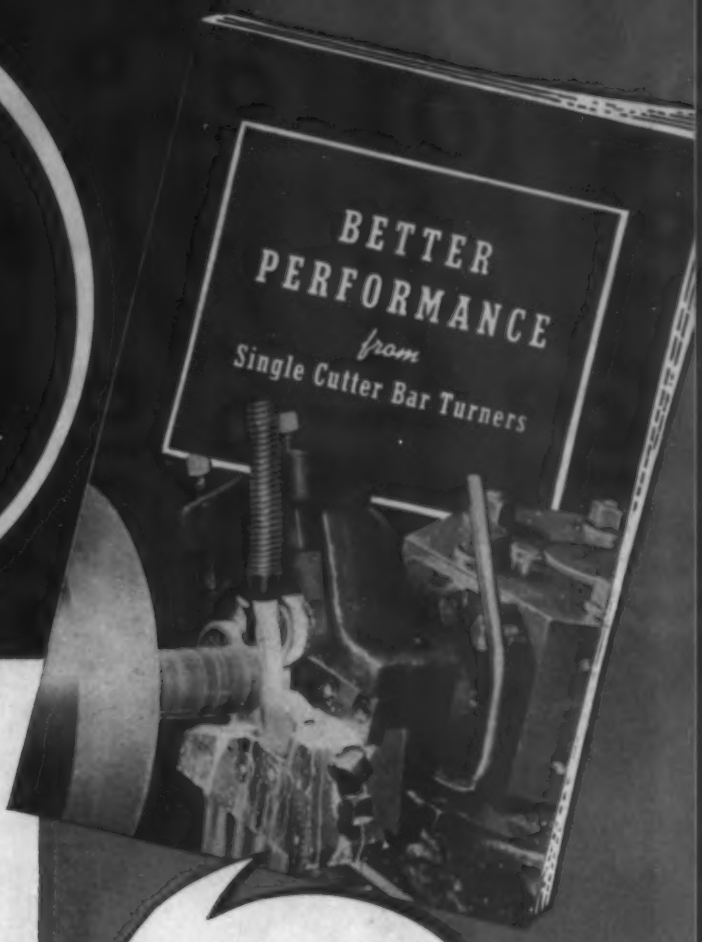
West Coast Series

■ Beginning next week STEEL will publish a continuing series of articles on the west coast written by Art Allen, Detroit Editor, and John Knox, Steel Plant Editor, both of whom recently completed extensive trips all through the west visiting and inspecting the new aviation, shipbuilding and steel plants. Don't miss the first installment next week.

Vol. 113, No. 6, August 9, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 43

DO YOU REALLY KNOW YOUR BAR TURNER?



Here's How You Can Learn the Full Possibilities of Your Bar Turner

ONE of the most important tools employed in metal turning is the Warner & Swasey Single Cutter Bar Turner. It is used more than any tool on turret lathes set up for bar work.

Field studies in dozens of plants indicated the urgent need for a better understanding of the several fundamentals governing the setup and operation of this tool.

The information and many helpful hints assembled in the new Warner & Swasey booklet, "Better Performance from Single Cutter Bar Turners", can improve performance of this basic turret lathe tool and increase production in your shop.

Just issued — new 32-page illustrated booklet shows how to make the most efficient use of the Single Cutter Turner on bar work.

GET IT QUICKLY BY USING THE CONVENIENT COUPON

WARNER & SWASEY
Turret Lathes
Cleveland

Warner & Swasey Operator's Service Bureau, Cleveland, Ohio

Please send booklet, "Better Performance from Single Cutter Bar Turners".

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I work at (Company) _____

ST-10

YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

MATTISON ABRASIVE BELT GRINDING AND POLISHING MACHINES . . .

Mattison G-124 Automatic Stroke Grinding and Polishing Machine has automatic power stroke for flat grinding. It is a fast cutting machine, due to roll pressure having a point contact.

★ Results obtained in a number of plants definitely establish the use of factory-coated abrasive belts as a most efficient practice. Besides reducing the number of rejections and improving the finish, they have cut the polishing cost per piece through increased production.

However, to secure full benefit from factory-coated abrasive belts, the right type of mechanical unit is necessaey. The machine is all important for properly applying the abrasive to the particular job to be done.

Mattison Abrasive Belt Grinding and Polishing Machines are engineered with a knowledge of the factors involved to give the best application of belts. From the time factory-coated abrasive belts were introduced for metal grinding and polishing, Mattison's have developed and built machines to provide best results.

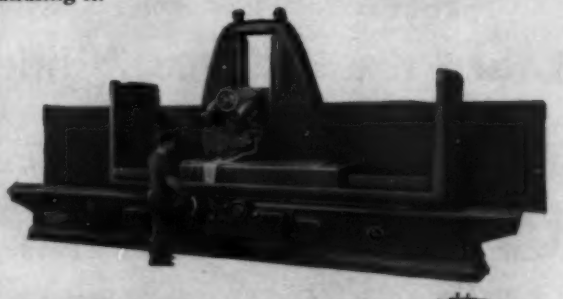
Mattison Abrasive Belt Grinding and Polishing Machines are used for smoothing up welding marks, polishing solid parts—such as handwheels, levers, handles, steel sheets including stainless steel—and the inside of tubes. They are built for both the wet and dry grinding method. In addition to the finishing of metal parts, they are used for plastics, hardened rubber, fibre, glass, etc. In fact, the applications are so numerous, only a few can be mentioned and shown on this page.

Whatever your problems may be, it is well worth while to make an investigation as to the machine available for handling it.

Mattison G-472 Spotting Machine is used for spot grinding steel sheets.

MATTISON GRINDING MACHINERY

Mattison L-137 Hand Block Grinding and Polishing Machine for flat, as well as contour work. With shaped hand blocks, this machine will perfectly grind and polish edges of practically any contour.

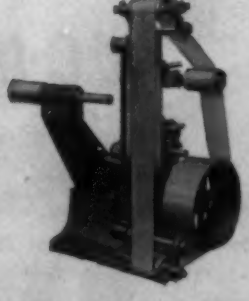


The Mattison High-Powered Precision Surface Grinder is well known throughout industry for its precision work and ability to speed production. →

Mattison S-441 Grinding and Polishing Machine for flat and curved work. Can be furnished with or without special fixtures, depending on work ground. ←

Mattison W-455 Wide Belt Grinding and Polishing Machine for finishing of wide, stainless steel sheets.

Mattison H-424 Internal Tube Grinding and Polishing Machine for finishing inside of metal tubes.



Mattison J-115 Variety Belt Grinding and Polishing Machine for flat and curved surfaces. →

Mattison L-138 Grinding and Polishing Machine arranged for wet grinding.

Mattison J-135 Idler Stand and Pulley adapts regular polishing jack to the use of factory-coated abrasive belts. →

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

WAR HEADS for TIN FISH

READY to be loaded with explosives, these war heads of giant, one-ton aircraft torpedoes are getting a final inspection. Producing the surface finish shown in the photo, as well as the more than 5,000 component parts of a completed torpedo, requires top performance from machine tools and cutters.

In the precision machining not only of torpedo parts but of millions of bullets, shells, guns, tanks and planes, war plants everywhere are assured of faster output and increased cutting-tool life, by using *Texaco Cutting Oils.*

Texaco Sultex, Transultex and *Cleartex Cutting Oils* lubricate the tools, carry away the heat and prevent chip welding, assuring improved surface finish, and maximum output per tool grind.

So effective have Texaco lubricants proved that they are definitely preferred in many important fields, a few of which are listed in the panel.

A Texaco Engineer specializing in cutting coolants will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

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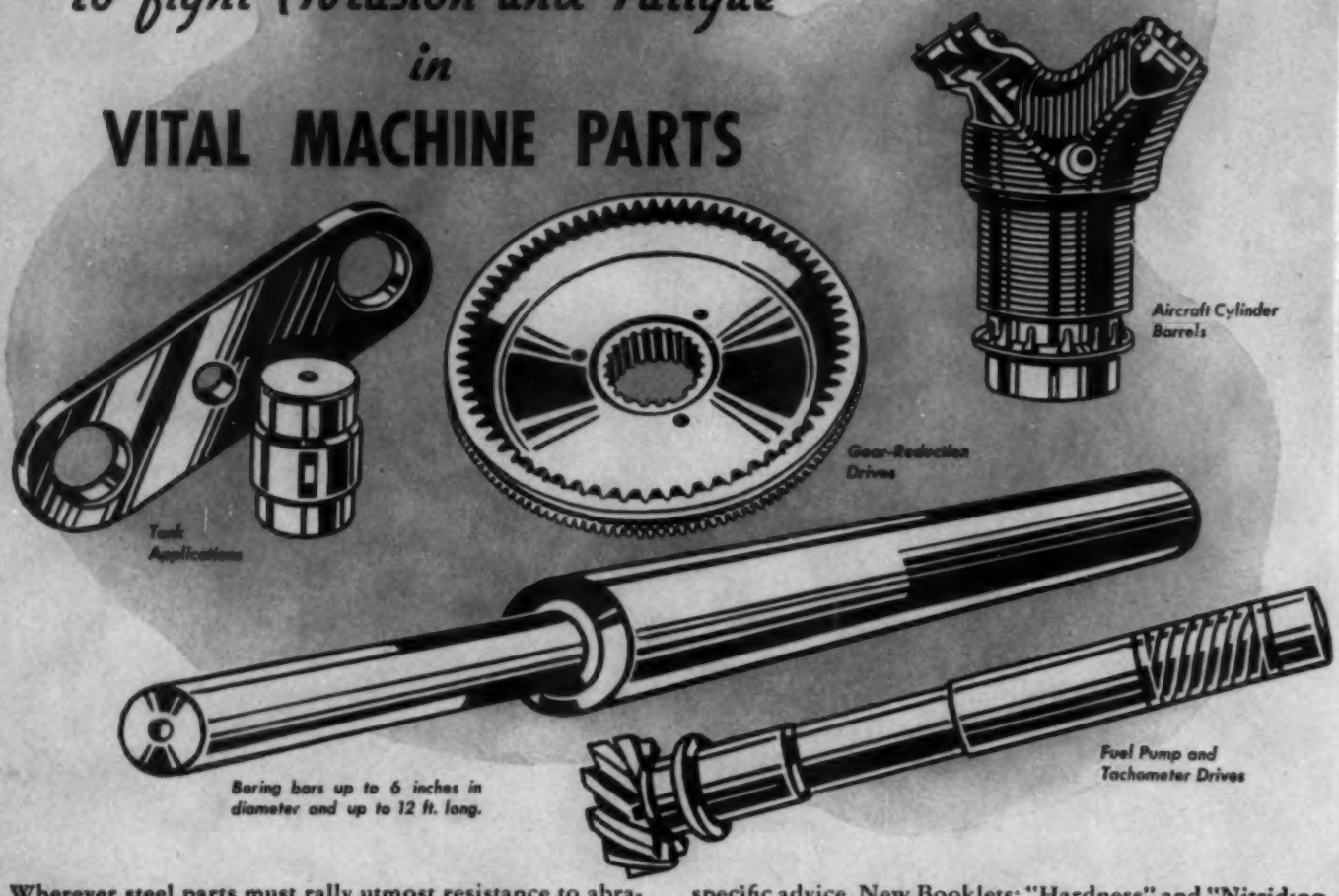
TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Enlist THE HARDEST STEEL SURFACE KNOWN

to fight Abrasion and Fatigue in VITAL MACHINE PARTS


Aircraft Cylinder Barrels
Gear-Reduction Drives
Tank Applications
Boring bars up to 6 inches in diameter and up to 12 ft. long.
Fuel Pump and Tachometer Drives

Wherever steel parts must rally utmost resistance to abrasion, Nitrided Nitralloy offers unequalled advantages. So hard is the Nitrided case that it takes special testing methods to indicate its 850 to 1200 diamond Brinell hardness. Nitrided Nitralloy greatly extends the life of machine parts subject to friction under the most adverse conditions, even under faulty lubrication, and temperatures as high as 1000° F. In resisting fatigue due to repeated stresses, Nitrided Nitralloy displays notable endurance—A result of the properties of Nitralloy steels and the effect on them of the Nitriding process. These properties of Nitrided Nitralloy explain its power to extend the useful life of machinery, thus saving steel, conserving plant capacity and manpower.

Today, of course, the available supply of Nitralloy is used for war equipment parts where nothing else will match it—as in aircraft engine and tank parts. Its future is in serving your post-war requirements. Write to us, or any of the Companies listed below, for technical data and specific advice. New Booklets: "Hardness" and "Nitriding Furnaces" will be sent on request.

NITRIDING is the process of case hardening certain alloy steels by means of a nitrogenous medium, such as ammonia gas. The alloy steels that are most suitable for Nitriding are known as NITRALLOY.

Some of the wide variety of applications for which NITRIDED NITRALLOY steels excel:

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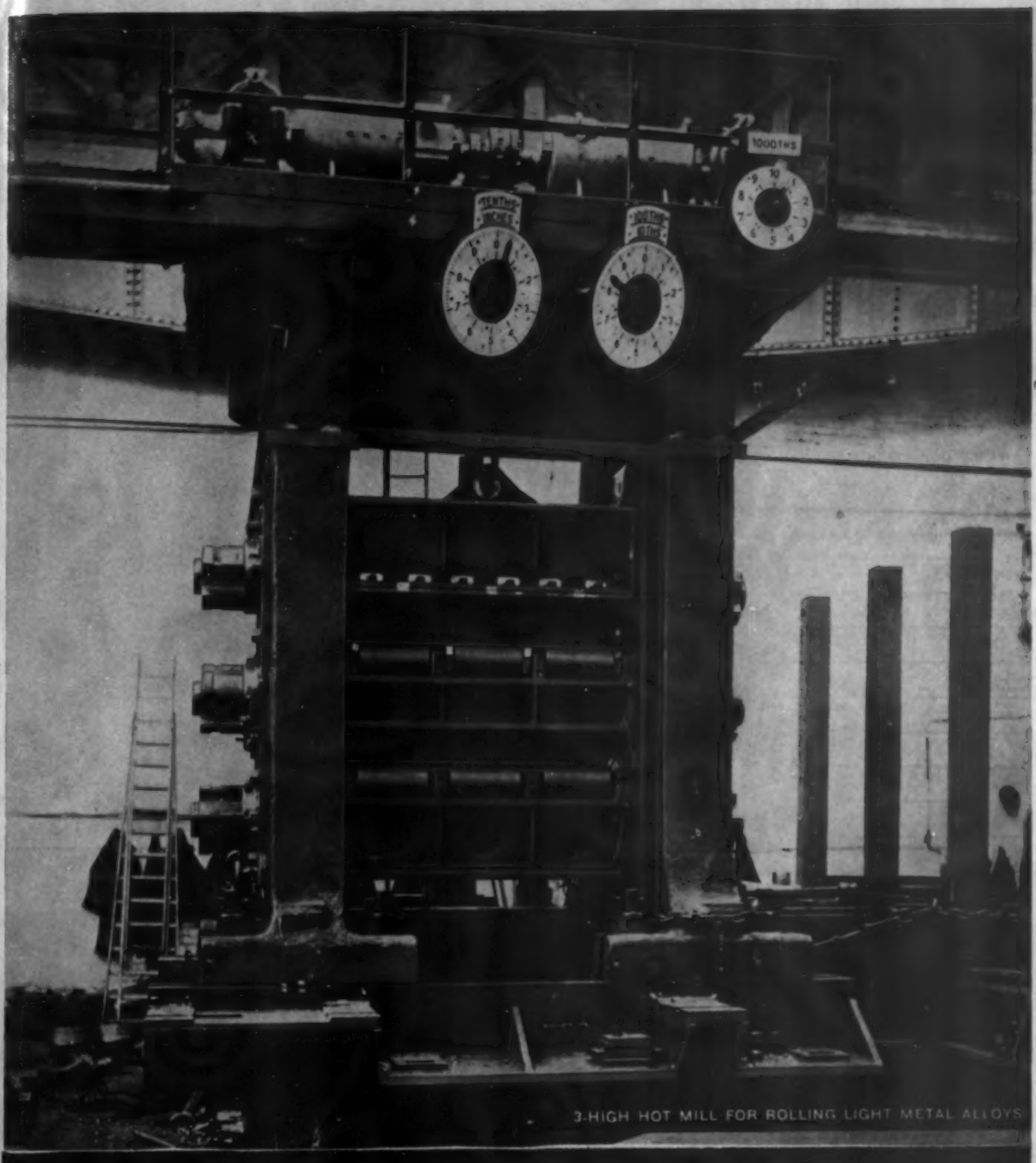

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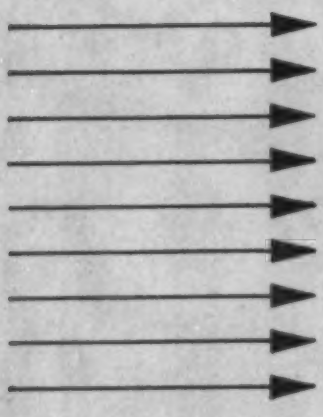

Three new electrolytic tin-plating lines have been installed at Weirton, and are now in full operation for the production of electrolytic tin plate.

This means that electrolytic tin plate is now available in WEIRITE quality. And the WEIRITE trade-mark is your assurance of a quality product, uniform in gage, ductility and coating—a product which will meet your most exacting specifications.

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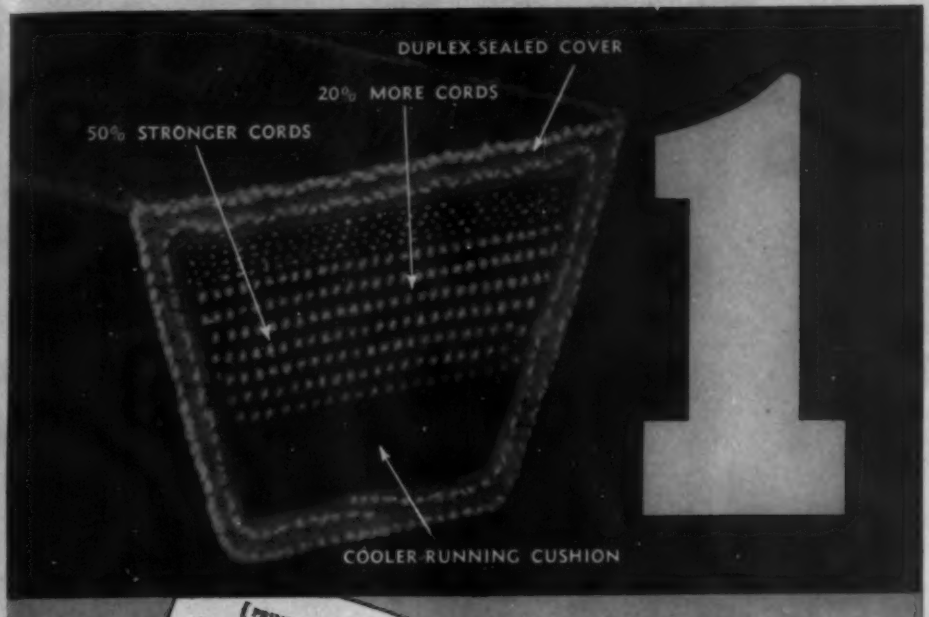

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Whatever brand of V-belts you are now using, you can make them last *longer* by following the tips in Allis-Chalmers' free handbook: Plain Facts on Wartime Care of Rubber V-Belts." Typical contents: how V-belt anatomy affects maintenance . . . good rule-of-thumb for tension . . . seven dead V-belts and what killed them. Packed with practical data, fully illustrated, the new handbook is specially suited for training new men. Tear off the coupon below and send for this valuable new handbook today!

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ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

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Wire to the Axis

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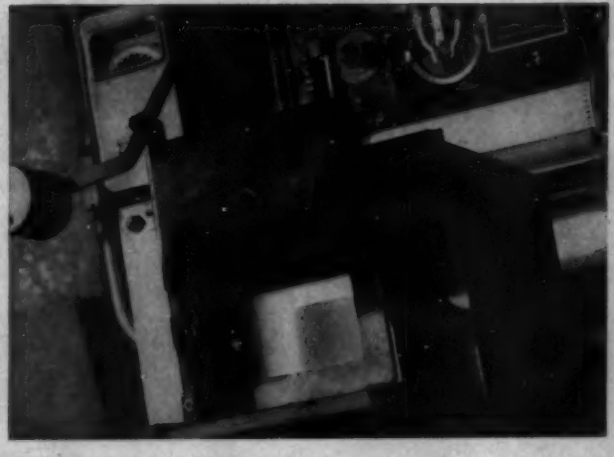
During our 122 years, in which we have pioneered many of the basic developments in this highly specialized material, quality and dependability in wire have become Wickwire Spencer traditions.

If you have need for wire, put it up to experts. Wickwire Spencer Steel Company, 500 Fifth Avenue, New York (18); or Buffalo, Chicago, Detroit, Philadelphia, San Francisco, Worcester.

EVERYTHING IN WIRE. High and Low Carbon Wire—Wire for Springs, for Wire Rope, for use in scores of industries, in a variety of sizes, tempers, grades and finishes.



WIRE METALLURGY is a down-to-earth science in the Wickwire Spencer laboratories. It helps customers find answers to all sorts of wire applications.

SEND YOUR WIRE QUESTIONS TO WICKWIRE SPENCER

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Hansen hose clamps are easy to install requiring no special tools, have two grips instead of one, inside and outside of hose. Safe working pressure of 500 pounds. Economical, can be used many times over. Neat, trim and tailored.

HANSEN MFG. CO.

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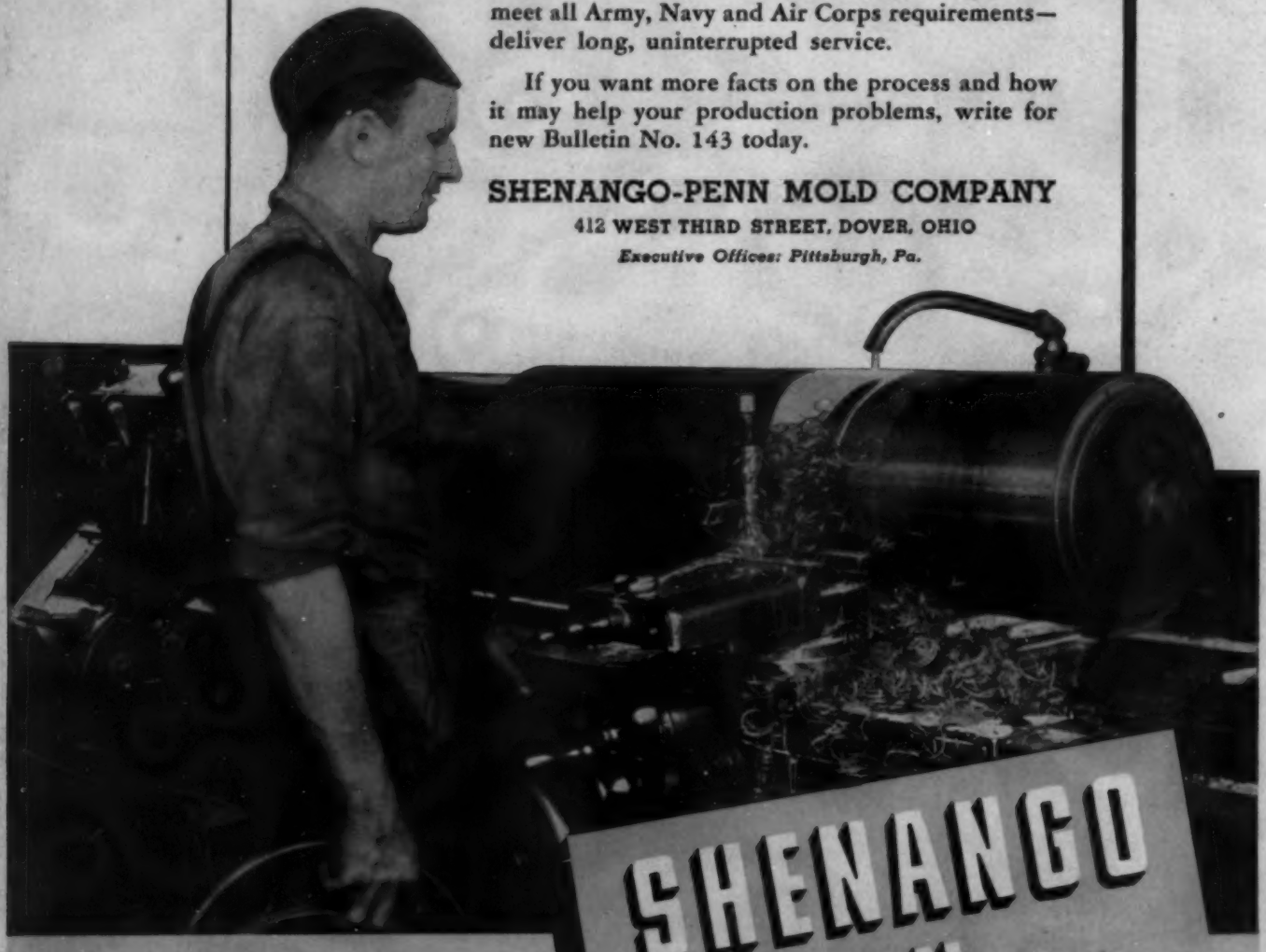
The Trend is Toward
SHENANGO-PENN
Centrifugal Casting

MANY manufacturers are finding that *centrifugal casting* by Shenango-Penn offers an improved, economical process for producing vital war products. In the marine and aviation fields, parts formerly made by other methods, are now being produced centrifugally, with impressive savings in production time—the conservation of critical materials—and actual improvement in product performance.

Shenango-Penn has pioneered centrifugal casting—can cast tubular bars or cylinders ranging from 2" to 26" O.D. and up to 26 ft. in length, that meet all Army, Navy and Air Corps requirements—deliver long, uninterrupted service.

If you want more facts on the process and how it may help your production problems, write for new Bulletin No. 143 today.

SHENANGO-PENN MOLD COMPANY
412 WEST THIRD STREET, DOVER, OHIO
Executive Offices: Pittsburgh, Pa.



ALL BRONZES • MONEL METAL • ALLOY IRONS •

SHENANGO-PENN

Low-Alloy Steel Railroad Equipment Improves Mining Operations

Strong, lightweight railroad equipment made of chromium-copper steel has proved a big asset to the coal-mining industry. It lasts longer, increases hauling capacity, and reduces operating costs.

The remarkable service record of low-alloy steel railroad equipment is due to the strength and resistance to corrosion of the steel. Tests indicate that the corrosion rate of the chromium-copper steel is only about one-fourth that of plain carbon steel. Obviously, replacement is markedly reduced, and repair time is cut to a minimum.

Mining cars of the low-alloy steel can carry more payload because the cars weigh less. The greater payload can be hauled without loss of train speed. Lightweight empties need less power to move them; hence operating costs are lower. And with less weight on wheels and track systems, maintenance costs are reduced.

The advantages of using low-alloy steel in mining cars can be duplicated in other applications. Cross-country coal cars must also be strong and corrosion-resistant. Other industries have transportation problems similar to those of the mining industry that might be solved by use of chromium-copper steel.

For information on the selection or use of alloy steels, call on us. We do not make steel, but we produce the ferro-alloys needed in steelmaking. Our metallurgists have studied alloy steels in the laboratory and in the field for over 35 years. The knowledge gained from their experience is at your service.

BUY UNITED STATES WAR BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
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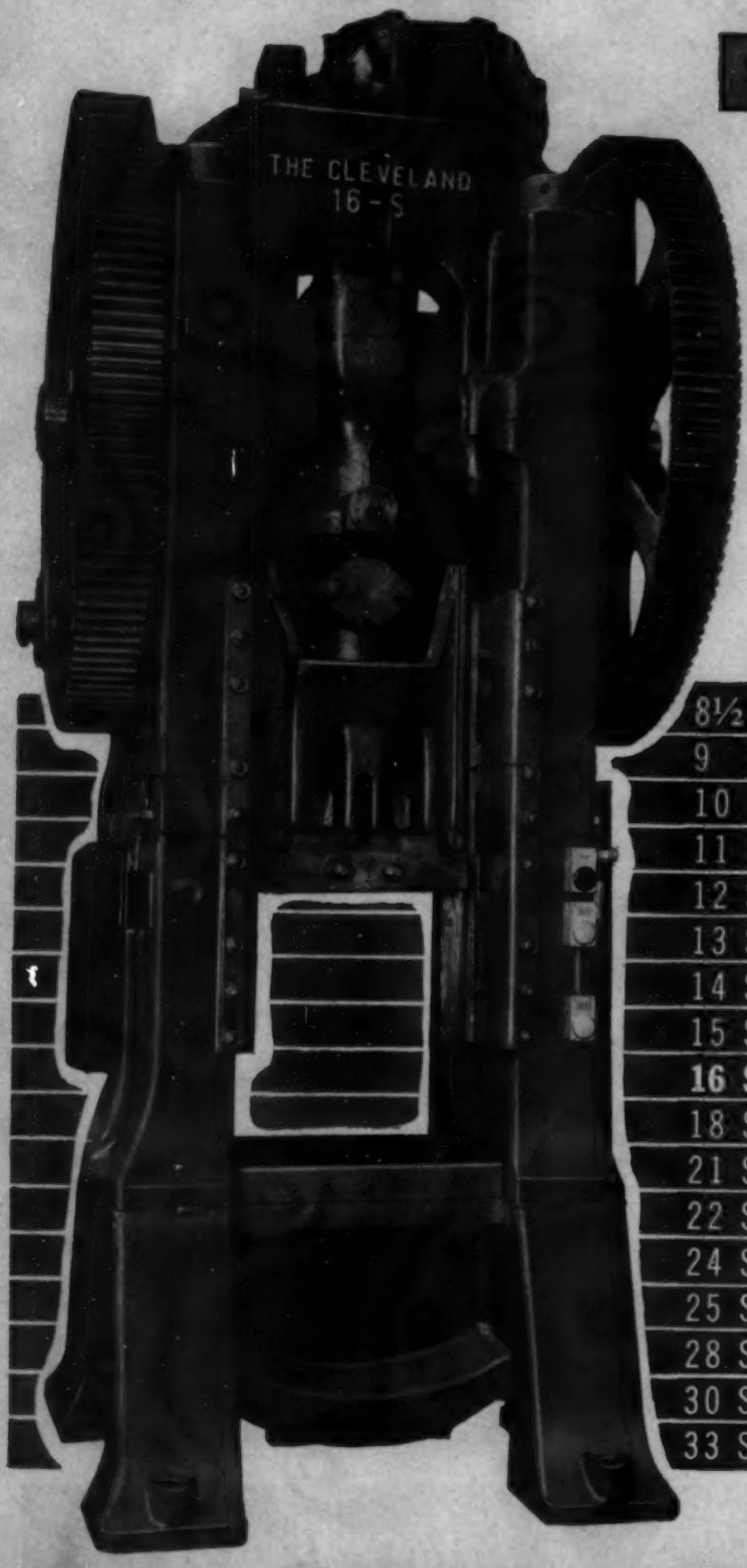
Ferro-Alloys & Metals

CLEVELAND Straight Sided

Single Crank

PRESSES

From 60 to 1300 Tons Capacity



8½ S	60 Tons
9 S	72 "
10 S	90 "
11 S	110 "
12 S	130 "
13 S	150 "
14 S	180 "
15 S	215 "
16 S	**255** "
18 S	345 "
21 S	500 "
22 S	550 "
24 S	665 "
25 S	750 "
28 S	925 "
30 S	1070 "
33 S	1300 "

Cleveland Straight Sided Single Crank Presses can be furnished in a wide range of sizes with capacities from 60 Tons to 1300 Tons and in most cases the stroke, adjustment, bed area, etc. can be modified to suit particular requirements.

These Cleveland Presses are ruggedly and accurately constructed and are provided with extra long slides supported in carefully fitted gibs which allow ample bearing surface for the slide even when it is at the extreme end of its stroke.

The four piece steel tie rod type of construction consists of a base, two uprights and a crown, securely held together by four massive steel tie rods which, also take the stress usually transmitted to the frames of the one-piece type of Presses.

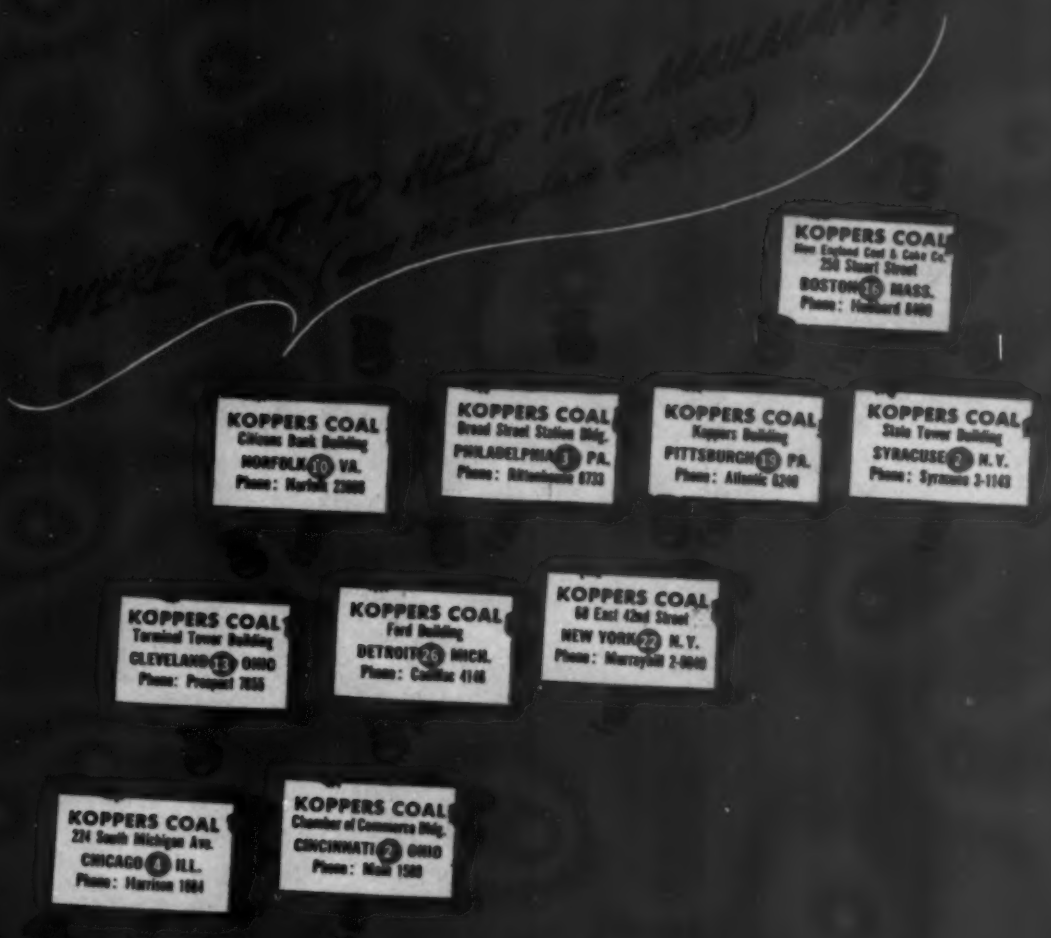
In the larger sizes, twin drive of the crankshaft is usually employed to prevent undue torsional strain on the crankshaft.

●

The Press illustrated is a 16 S, twin drive, double geared equipped with a single station electrically controlled, air operated friction clutch and brake. The Press has a capacity of 255 tons and operates at 16 strokes per minute.

THE CLEVELAND PUNCH & SHEAR WKS CO. U.S.A.

THE CLEVELAND PUNCH & SHEAR WORKS CO CLEVELAND · OHIO



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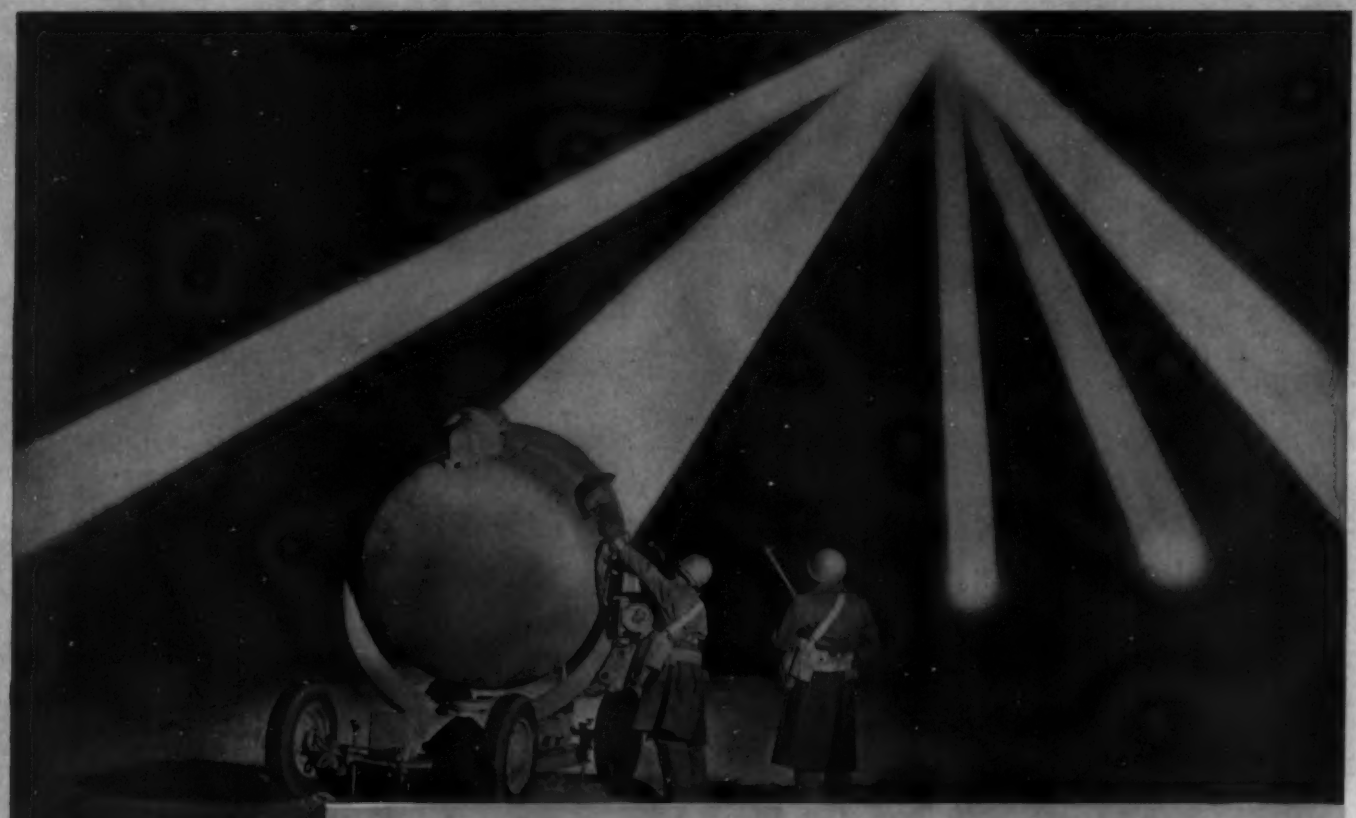

Sky Trap for Zeros

SET AND SPRUNG . . . IN SECONDS . . . BY MATCHED MOTOR AND CONTROL

The siren wails ... the searchlights and locators of this "Zero Trap" swing into position as a unit. Wherever the locator points, there also points the searchlight — instantly and automatically. Enemy aircraft are detected and spotted in seconds for anti-aircraft gunners to send to their doom.

This important complete co-ordination is made possible by matched motor and control which duplicate the movements of the locator. Without it, many vital extra seconds would be consumed for the operator to instruct the searchlight operator where to direct the light beam.

The power behind this "sky trap" is an engine-driven generator set — with cooling fan motor and control panel. This unit supplies power for the arcs, movements and control mechanisms of the searchlight system.

This is only one of many Westinghouse war motor applications...applications that build up engineering experiences you can use. Save time, save money, save effort on your next motor and control job. Just call your nearest Westinghouse Office for "jiffy" help. Westinghouse Electric & Mfg. Co., Dept 7-N, East Pittsburgh, Pa.

J-21286

Power plant control panel for co-ordinating searchlight and sound locator. Fan motor (middle) and d-c generator.

Westinghouse MOTORS AND CONTROL

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In pictures, charts, graphs and photo-micrographs . . . in clear, explicit words . . . it tells what Stainless Steel will, and will not accomplish. It is your guidebook on *when, where, how* and *why* to use the various types of Stainless. A copy will be sent to you on request.

Rustless Service does not stop with placing this book in your hands. Every order we receive from you is checked and rechecked by men who (like all Rustless personnel) are specialists on the applications of Stainless Steel. They will help you to avoid ordering the wrong type of Stainless Steel.

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STAINLESS STEELS

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RUSTLESS IRON AND STEEL CORPORATION, BALTIMORE, MARYLAND

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★ *Back from a bombing mission—an engine missing—a rudder all but shot away. Under trees, on sandy deserts, our skilled Air Corps mechanics are "keeping 'em flying"—within earshot of enemy guns.*

Get 'er *Flying* in a hurry

When a mission must be carried out, there is no time to baby an airplane! The machine shop may be under a tree with the sky for a hangar roof, but the orders are: "Get 'er flying—in a hurry!"

It takes a tough ship to stand the daily pounding these missions entail. It takes a tough engine to keep that ship flying with minimum time out for repairs and overhauls. And this is the job that Pratt & Whitneys are performing—a job that is writing their fame in smoke and fire over Axis-ruled lands.

But the toughness of these engines comes, not from rugged construction—not from "beefed up" parts, but from the close tolerances to which every part is held—a precision that makes possible great strength coupled with lightness.

The lightweight precision gears that have been developed for this engine—gears that are today being made in huge quantities at Foote Bros.—give promise to American manufacturers of new efficiency and new economy in the transmission of power when the war is won.

FOOTE BROS. GEAR AND MACHINE CORPORATION
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Better Power Transmission Through Better Gears

and keep them COLD!

Jim and Jane are heavy users of springs — in the machines they run in war plants — and in the appliances they use at home. The engineering skill that made these mechanisms so dependable is doubly appreciated today, when many civilian goods are off the market for the duration. Mechanical action usually relies on springs — and in the degree that these springs have been carefully designed lies the success or failure of a mechanism. It is important now — it will be increasingly important when engineering talents return to peace-time developments.

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NATIONAL METAL CONGRESS *and* WAR CONFERENCE DISPLAY

"BASE OF OPERATIONS" for the Metal Industry

Chicago PALMER HOUSE **October 18 thru 22**

America's metal industry will move its "base of operations" to Chicago's Palmer House the week of October 18 to take full advantage of the 25th annual National Metal Congress and War Conference Display.

Devoted to increased production of war products, to conservation of materials, and to postwar planning, this year's Congress and Conference Display will bring vital new developments and ideas to the attention of thousands of war production executives and engineers in the metal industry.

More than a hundred technical lectures will be presented by the four cooperating societies. Leaders in the metal industry and government will participate in the Special War Production and Conservation Sessions held each day by the American Society for Metals, sponsor of the event.

Hundreds of manufacturers will participate in the War Conference Display to be held in the Palmer House itself. These companies will have their engineers, their literature, light equipment and parts at these Conference Display rooms to help metal men solve their problems and increase production.

For complete information on these War Conference Displays — write or wire the American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio. Phone Endicott 1910.

NATIONAL METAL CONGRESS AND WAR CONFERENCE DISPLAY

Under the direction of the American Society for Metals, in cooperation with the American Welding Society, the Wire Association, and the Institute of Metals and Iron and Steel divisions of the American Institute of Mining and Metallurgical Engineers.

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IS IDEAL FOR COLD-SAWING NON-FERROUS METALS—

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Alloy Brass Copper
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Watch the Motch & Merryweather Cold Sawing Machine race through non-ferrous metal and you will be convinced that the equipment was designed from the floor up for this specific purpose. *No after-thoughts have been "tacked on."* Note the high surface speeds of the saw blade and the rapid hydraulic feed which readily keeps pace. Study the balanced drive and solid construction which easily sustain the operation, requiring a minimum of horsepower. Observe how the Motch & Merryweather Segmental Type Saw Blade cuts fast, clean, square, without chatter or burr . . . Only Motch & Merryweather builds *all 3:* the blade, the machine that uses it, and the saw sharpener that grinds it. Get Bulletin.

Have you a problem involving any of the metals named at the left? A full description will bring you a satisfying answer.

THE MOTCH & MERRYWEATHER MACHINERY COMPANY

Penton Building • Cleveland, Ohio

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MOTCH AND MERRYWEATHER MACHINERY CO.
CLEVELAND DETROIT CINCINNATI PITTSBURGH

ROEBLING "Blue Center" holds her fast

A 50-TON SCHNOZZLE for a cargo vessel is a tricky load to swing around on the end of a line—particularly when that load has to be picked up, *turned over,* and moved gently into place with finger-span accuracy! But watch these boys do it, with two whirley cranes and specially engineered slings! It's apple pie to them, because they've been doing it plenty—to the tune of more than 8,000,000 tons of finished ships in 1942! And they're going to get a lot of chances to improve with practice in floating the 16,000,000 tons planned for 1943!

Without these techniques in handling huge prefabricated ship sections, the phenomenal production rate couldn't have been achieved—and *doubled* this year! Thanks to the men who wouldn't be satisfied as long as a single shipbuilding record remained unbroken, our Merchant Marine is getting ships as fast as they can be manned with trained officers and crews! Thanks to the equipment, too, that helped those men break records—bigger cranes, automatic welding machines, *wire rope* . . .

Yes, wire rope is playing a big part in floating tonnage for Victory. And wherever you find the tough going of handling hunks of ship as big as houses, you'll find Roebling "Blue Center" in there slugging too . . . Not just in building ships, either, but on construction projects, materials handling jobs, and with every branch of the fighting forces . . . Bringing to the toughest jobs of all the stamina built into it by more than a hundred years of wire rope engineering!

ROEBLING

"Blue Center"

STEEL WIRE ROPE

PREFORMED OR NON-PREFORMED

YOU CAN HELP *YOUR* ROPES HOLD FAST... *LONGER!*

WHATEVER YOU'RE PRODUCING for Victory, if you're using wire rope, it's a part of your war job to make that rope *last!* Nothing difficult about that, either, if you follow a few simple rules of rope conservation. To make it even easier for you, though, Roebling Engineers have prepared this handy 4x5-inch tag, summarizing the most important and essential points in conserving wire rope. Printed in two colors on heavy stock and varnished for easy wipe-off cleaning, the Roebling Conservation Tag fastens right on your rope-rigged equipment, where your operators will be constantly reminded of rope conservation as a part of their war jobs! Send for your free supply today. Ask for Tag "A".

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Aristoloy Steels are made only in electric furnaces. Today, they are fighting and flying in battle. Tomorrow, they not only will fly, but will perform everyday miracles for all of us in the form of new, peacetime products.

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ELECTRIC FURNACE STEELS

P&H HEVI-LIFT HOISTS

ARMY E NAVY

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"Ready? Hoist! We'll show 'em a thing or two about production. And hang up some records they can't forget."

But for war, they might never see the inside of an industrial plant. But here they are—thousands of older men and women—giving their best to overcome lack of experience—to keep faith with our fighting forces—to make sure that vital supplies are neither too little nor too late.

As these new workers take the places of experienced men, more and more Hevi-Lift Hoists are joining them to facilitate the handling of heavy loads on and off machine tools, along assembly lines, in shipping departments and loading zones—wherever fast handling can lessen labor, save time, and speed the war effort.

P&H HEVI-LIFT HOISTS

Built in capacities up to 15 tons. Five-step variable speed push-button control is available for lifting, lowering or horizontal trolley travel. Write for literature.

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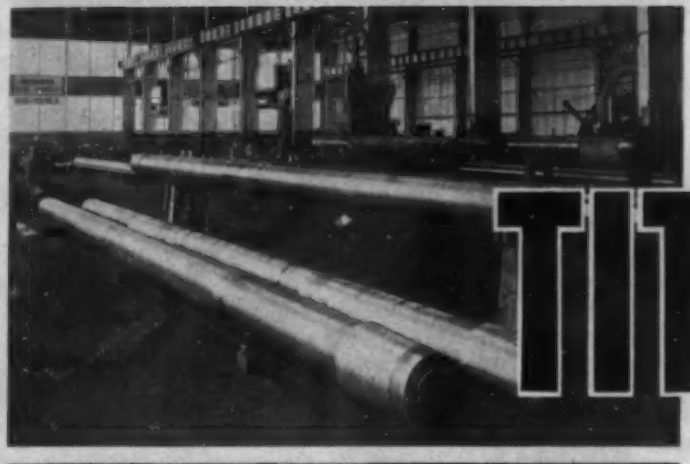
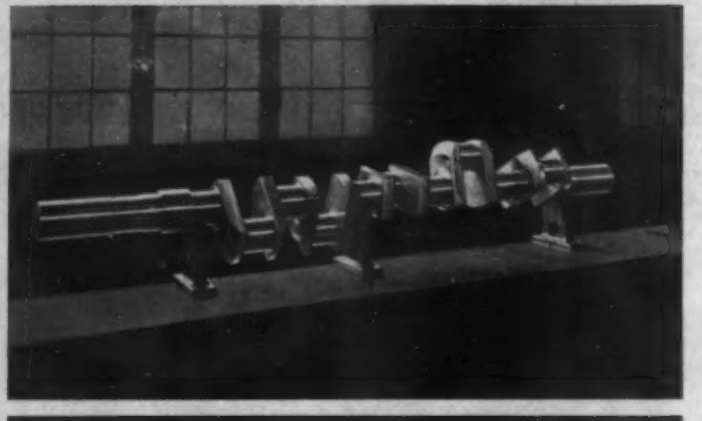


TITUSVILLE

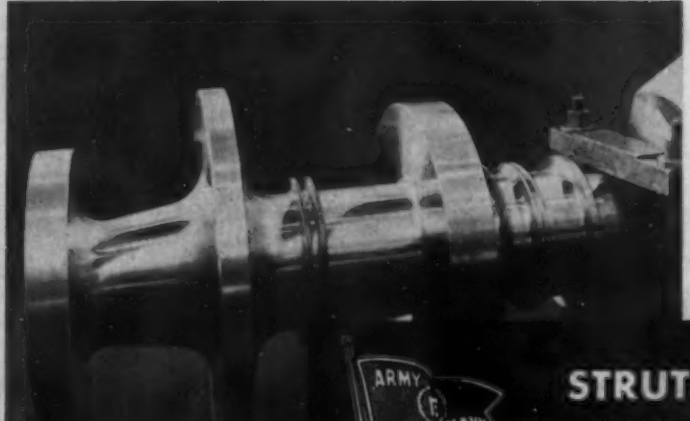
FORGINGS

Forging presses up to 2000 tons in size are busy forging Armament Breach Housings and other war essential Heavy Steel and Alloy Forgings.



MARINE SHAFTING

Three large, modern equipped machine shops accurately finish Struthers Wells Forged Propeller Shafts, Line Shafts and Thrust Shafts for Marine service everywhere.

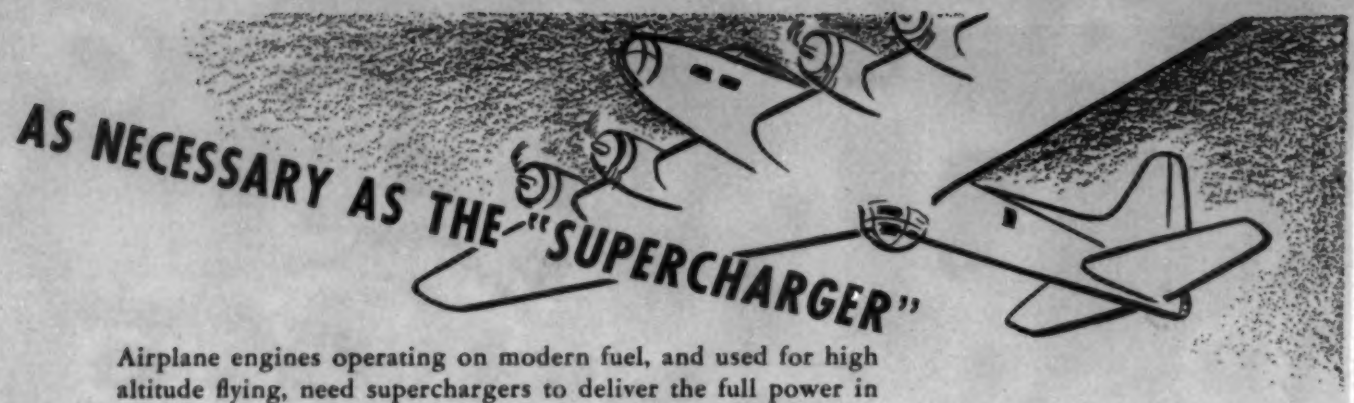


CRANKSHAFTS FOR DIESEL ENGINES

Struthers Wells' experienced modern engineering and production craftsmen are producing large numbers of Forged Diesel Engine Crankshafts for America's war power needs.

ARMY E NAVY E

STRUTHERS WELLS CORPORATION
TITUSVILLE FORGE DIVISION
TITUSVILLE, PENNSYLVANIA



AS NECESSARY AS THE "SUPERCHARGER"

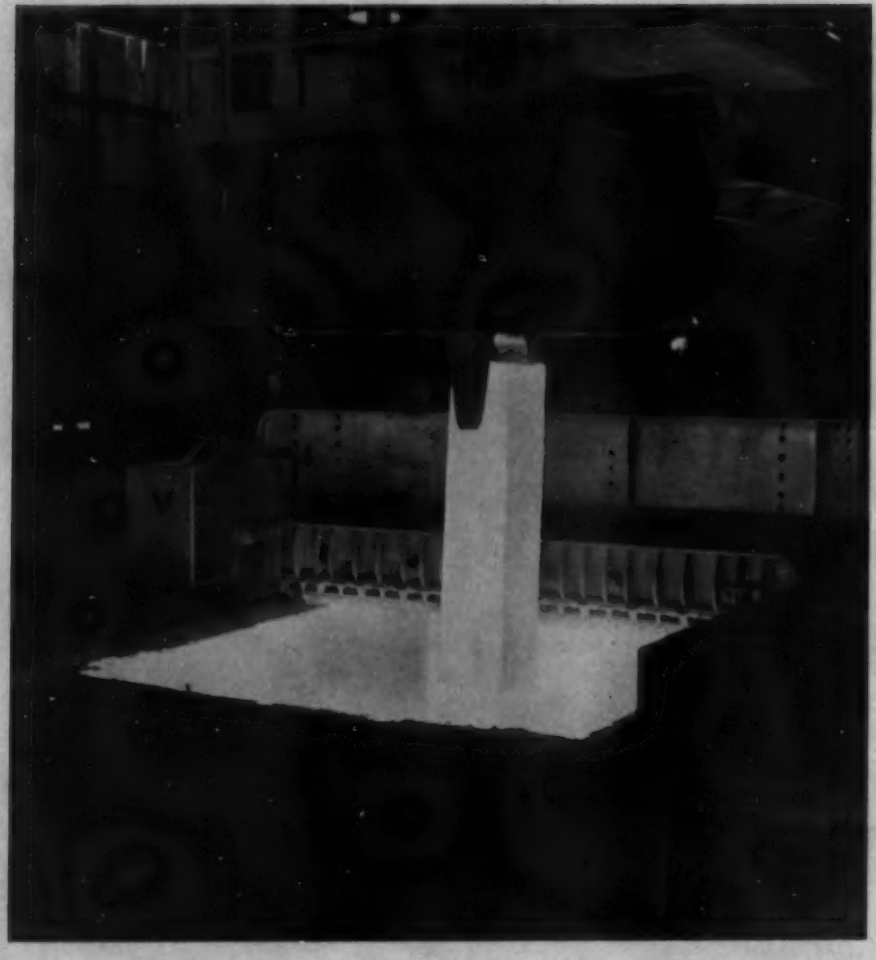
Airplane engines operating on modern fuel, and used for high altitude flying, need superchargers to deliver the full power in the fuel.

TO GET *Maximum Performance* FROM YOUR FURNACES OPERATING ON PREHEATED AIR—

You Need

BLOOM

MODERN DESIGN BURNERS



Modern Soaking Pits using preheated air, equipped with Bloom Burners.

Preheated air offers you many advantages —greater production, better fuel rates, lower costs—but experience shows that old-fashioned gas or oil burners won't deliver the full values available to you in preheated air. Just as an airplane engine needs a supercharger for high altitude flying, so does a furnace operatmg on "rarefied" superheated air need special burners to gain maximum benefits.

For many years, Bloom Engineering has studied the problems arising in the application of burners for preheated air. Today, we are able to offer you burners developed through that experience, in which the following practical advantages are incorporated.

1. Low resistance to flow of air through the burner (Pressure drop—¼ inch of water).
2. Uniform flow of air into combustion chamber, provided by built-in angle deflectors.
3. Absence of localized hot spots or excessive flame temperatures assured by delayed combustion.
4. Burner body protected from heat by refractory lining.
5. Extensive combustion engineering experience to guide in the arrangement and installation of your burners.

Whether used for soaking pits, billet heating, heat treating, forging or other types of furnaces, BLOOM BURNERS will help you increase output and improve fuel rates.

BLOOM ENGINEERING CO.

857 West North Avenue

PITTSBURGH, PENNSYLVANIA

FIGHT RUST AND CORROSION

with L-M Copper Tubing. It is immune to rust and highly resistant to corrosion. Many of our fighting machines—army trucks, tanks, warships, cargo vessels, airplanes—are equipped with

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LEWIN-MATHES COMPANY · · SAINT LOUIS, MISSOURI

EGYPTIAN

Victory "Spec" Finishes

As the world map changes and the black areas happily grow smaller, radical changes occur in war equipment.

Not yet are we ready to beat our swords into ploughshares. But tanks are giving way to locomotives, old contracts for certain parts are not being renewed; we are approaching the saturation point on instruments, small arms and camp equipment. Contracts are being let for needed new and different materials.

As the battle fronts change, so change the production fronts—and the finishing fronts.

New and revised Finish Specifications for wartime equipment will shortly be issued. And as usual EGYPTIAN will be ready to meet them!

The newly revised 1943 edition of our book "United States Government Specification Finishes" will soon be ready for distribution to those interested in wartime finishes. Reserve your copy today. Please address Dept. S.

THE EGYPTIAN LACQUER MANUFACTURING CO.
ROCKEFELLER CENTER—NEW YORK, 20, N. Y.

EGYPTIAN
Superior FINISHES

Advertisement AUGUST, 1943

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Duronze III Serves Tough Wartime Assignments

Hot Forgings Provide Great Strength and Resistance to Shock and Fatigue

Just as it takes an unusual situation to bring out leadership among men—the war is bringing out leadership among metals. One of the toughest assignments for metals is in the construction of high strength bolts for holding together the pipe flanges used in destroyers and submarines. Never before this war have American submarines been subjected to depth charges. Sudden shock from under-water detonation is so great that even bolts made from so-called high strength alloys have failed because of stripped threads and sheared-off heads.

Search for a Superior Alloy

The search for a superior alloy with a high tensile strength, resistance to salt water corrosion, yet satisfactory for hot forging hex-head bolts from round stock, led to the use of Duronze III for this job. Not only has Duronze III been found superior to alloys previously used but it replaces high nickel alloys whose nickel content is needed for more urgent war purposes. Duronze III has excellent machinability compared to many alloys previously used so that nuts can readily be made from hexagon stock and studs can be machined from round rod.

There is also a marked difference between Duronze III and other types of copper silicon alloys. Since the tensile strength of Duronze III is remarkably high for annealed and hot-forged material—above 85,000 pounds per square inch as compared to approximately 55,000 to 65,000 pounds per square inch for copper silicon alloys in the same physical condition—the shank of a hot-forged Duronze III bolt is apparently not appreciably affected by the heat necessary for hot-forging the head; whereas, the shank of a copper silicon hot-forged bolt made from hard drawn rod becomes annealed with a corresponding lower tensile strength. As a result, there is a tremendous difference in yield strengths, approximately 55,000 pounds per square inch for the shank of the hot-forged Duronze III bolts as compared to approximately 25,000 pounds per square inch for the hot-forged copper silicon bolts. Since metal stretches after the yield point is reached, pipe flanges held with hot-forged Duronze III bolts will not be affected at shocks which will loosen pipe flanges held with hot-forged copper silicon bolts.

The aviation industry uses many parts such as fittings for hydraulic lines and door hinges, both of which are hot-forged from Duronze III round rod. Duronze III screw machine parts are also used for tube fittings and in construction of bombing racks. Duronze III rod is used for shafting and spindles on electric control apparatus and it is used for working parts on machine guns. Parts of Diesel engines have also been made from Duronze III.

Ease of Forging Duronze III

Few alloys can compare with Duronze III in ease of forging and unusually high tensile strength when forged. It has, in addition, a high fatigue resistance and a low coefficient of friction. This alloy, when in contact with slow moving steel parts, resists abnormal wear. Often its great strength plus a lower specific gravity than brass or copper make it practical for replacing weaker alloys at a considerable saving in dead weight.

So many uses have been developed for Duronze III that the Federal Specifications Board has seen fit to change Specification QQ-B-666, Amendment 3, Grade B, to meet this alloy in chemical composition. A like change has been made in Navy Specification 46-B-17 (INT), dated May 15, 1942, for the same reason. A.S.T.M. Specification B150-41T was changed in chemical composition last year to include our alloy. At present the Aeronautical Materials Specifications Board have found the use of Duronze III so widespread in the aircraft industry that they have already written up a tentative specification to be included in the list of their specifications.

The physical properties of all of the Duronze alloys are tabulated in the Duronze Manual, which contains many data curves and illustrations of Duronze applications. Samples of Duronze III rod will gladly be supplied for test purposes.

Dip Brazing Process

Essentially, dip brazing is dipping the parts to be joined into a flux-covered molten brazing material contained in a refractory crucible. The copper-zinc alloys possess definite advantages for dip brazing because of the high strength and ductility which they show after the brazing operation. A copper-zinc ratio of approximately 57-43 has excellent properties. Lower percentages of zinc apparently are less satisfactory. This is of great importance because the brazed joint must withstand thermal contraction. A desirable effect is said to be obtained by small additions of iron, manganese and phosphorus.

Fittings for hydraulic lines, and bomb racks are ways Duronze III serves in our fighting aircraft.

Hot-forged Duronze III bolts for the pipe flanges on submarines resist the shock of depth charges.

Sliding gun parts of Duronze used to contact steel, wear less than when steel rubs against steel.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

INFLUENCE OF WATER COMPOSITION

In the last installment of this series the effect of the deposition of calcium carbonate on tube walls was discussed. For some purposes such depositions may be useful, for they will resist corrosion for generations. However, in water heating coils, boiler, and condenser tubes such a coating serves as an effective insulation which often results in "overheating" and "burning" failures.

The influence of the hydrogen ion (H^+), pH, has been studied in great detail and has been found to vary in its influence depending upon the metal being corroded and upon the concentration of all the other materials present. Generally an increase in the concentration of hydrogen ions accelerates the rate of corrosion of a metal.

The pH value is in a sense misleading since a low pH value indicates a high concentration of hydrogen ions and likewise a high pH value indicates a low concentration of hydrogen ions. This is understood better when it is remembered that mathematically expressed the pH is equal to the logarithm of the reciprocal of the hydrogen ion concentration in terms of gram equivalents per liter of solution, $pH = \log_{10} \frac{1}{[H^+]}$ or the negative logarithm of the hydrogen ion concentration $[H^+] = 10^{-pH}$. It is evident from the table below that the pH scale is much more convenient to use than Normality. For example if the activity is 10^{-n} normal the pH value of that solution is n, i.e. only the hydrogen exponent is used.

Pure water dissociates or breaks up to a very slight degree according to the equation $H_2O \rightarrow H^+ + OH^-$ so that it contains 1/10,000,000 of a gram equivalent of hydrogen ions per liter which is 1/100,000,000ths of 1% of hydrogen ion by weight! This also means that pure water containing 10^{-7} (pH 7.0) gram equivalents of hydrogen ions (H^+) must of necessity contain an equal quantity of hydroxide ions (OH^-). The product of these two quantities (the dissociation constant) is always the same $10^{-7} \times 10^{-7} = 10^{-14}$ at 25°C. Therefore if the concentration of hydrogen ions is 10^{-5}, the concentration of hydroxide ions must be 10^{-9}. The pH of 7.0 for pure water is also called the neutral point and water solutions with pH values below 7.0 have acidic properties and water solutions with pH values above 7.0 display basic properties. Exposure of pure distilled water to air, which contains approximately 0.04% carbon dioxide, lowers the pH to about 6.0 or lower. This represents a 10-fold increase in hydrogen ion concentration. Rain water has a pH of 6.0, acid swamp water a pH of 5.0, soda water (water charged with carbon dioxide gas) a pH of 3.8, and clean sea water a pH of 7.8.

RELATION BETWEEN HYDROGEN ION CONCENTRATIONS AND pH VALUES

	Concentration of Hydrogen Ions in Solution (Activity)		pH Value	Examples (25°C)				% by weight	Grams per liter
Increasing Acidity	1.39	Normal*	−0.14	Hydrochloric Acid	2.0	Normal		7.1	72.94
	1.00	"	0.00	"	1.2	"		4.3	43.70
	0.80	"	0.10	"	1.0	"		3.6	36.47
	0.44	"	0.36	"	0.5	"		1.8	18.22
	10^{-1}	"	1.0	"	0.12	"		0.44	4.37
	10^{-2}	"	2.0	"	0.01	"		0.036	0.364
	10^{-3}	"	3.0	"	0.001	"		0.0036	0.036
	10^{-4}	"	4.0	"	0.0001	"		0.00036	0.0036
	10^{-5}	"	5.0	"	0.00001	"		0.000036	0.00036
	10^{-6}	"	6.0						
	10^{-7}	"	7.0	Pure Water					
Increasing Basicity	10^{-8}	"	8.0						
	10^{-9}	"	9.0	Sodium Hydroxide	0.00001	Normal		0.000040	0.00040
	10^{-10}	"	10.0	"	0.0001	"		0.00040	0.0040
	10^{-11}	"	11.0	"	0.001	"		0.0040	0.040
	10^{-12}	"	12.0	"	0.01	"		0.040	0.40
	10^{-13}	"	13.0	"	0.12	"		0.48	4.80
	$10^{-13.6}$	"	13.6	"	0.5	"		2.0	20.00
	$10^{-13.9}$	"	13.9	"	1.0	"		3.8	40.01
	$10^{-14.0}$	"	14.0	"	1.2	"		4.6	48.00
	$10^{-14.1}$	"	14.1	"	2.0	"		7.4	80.02

*Normal, i.e. gram equivalents per liter.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Corrosion proofing of finished machinery, machine parts and instruments that are enclosed in sealed containers to protect them against moisture is said to be effected by the inclusion of silica gel in bags which have been developed for this purpose. The bag is made of breathing-type paper which permits the silica gel to absorb the moisture inside the package without dusting the contained material. **(No. 470)**

A newly developed line of steel bins for holding small work pieces within easy reach of an assembly job operator has been placed on the market. Each bin is fitted with a lip at the front to assist in picking up the parts. Five sizes, varying in width, are all 7¼ inches in length. Two styles are equipped with hoppers at the rear to provide a steady flow of the small parts. **(No. 471)**

Blue welders' glasses provide better vision for aluminum and bronze welding, glass working and similar operations where sodium yellow glare is present. This glass has been developed recently for reducing sodium yellow glare only. The standard green glass is still recommended for acetylene and electric arc welding. **(No. 472)**

A universal machine vise adaptable for mounting on any machine tool permits machining operations such as milling, drilling, grinding and boring at any angle. Complicated compound angles can be set up easily and quickly and the unit may be mounted to bed or table of the machine. The unit is portable and can be moved without disturbing the set angle or removing the work. **(No. 473)**

A pneumatic blow gun with pistol grip and trigger control has been designed for cleaning service in production plants. The gun is fitted with a removable nozzle that is interchangeable with longer units which can be inserted in deep holes and recesses. Connection is made through the handle with an adapter for a standard hose fitting. **(No. 474)**

A swivel head and flexible shaft for a portable drill has been placed on the market. A 30-inch flexible shaft with a ¼-inch core and an outside diameter of ⅝-inch serves to connect this new swivel drill head to a standard portable drill. The electric tool can be strapped to a belt worn by the worker and the swivel head grasped in one hand to do the drilling. **(No. 475)**

A hole punching unit has recently been offered with a built-in adjustable adapter which provides an adjustment up to 1½ inches front to back for off-center or staggered hole patterns. By designing the punch and die into the same independent holder it is possible to locate hole punching units in exact position by simply sliding the units along the rail or moving them from front to back on this new adapter and locking them in position. **(No. 476)**

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT 2, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze,* for stamping, deep drawing, forming and spinning.

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BRASS AND COPPER PIPE—"Plumrite"® for plumbing, underground and industrial services.

"Bridgeport" BRASS

Established 1865

BRIDGEPORT BRASS

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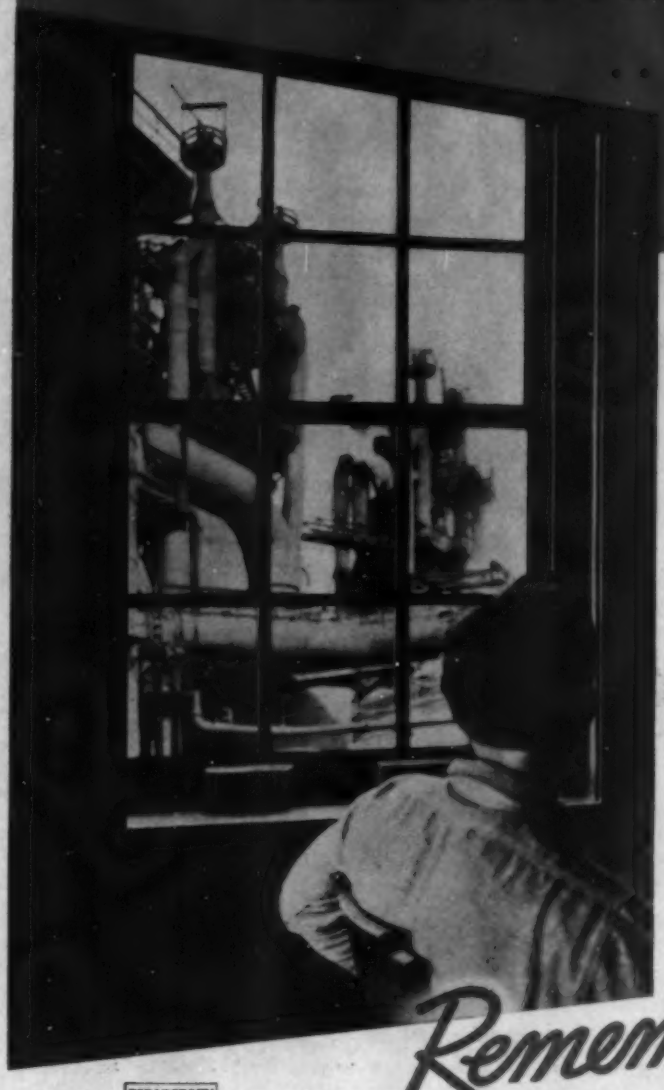
®Trade-name.

Your Blast Furnace Lining

. . . a Precision Product



HARBISON-WALKER blast furnace refractories continue to be made by the most modern Vacuum Power-Press method. They are fired in continuous car-type tunnel kilns at the high temperatures necessary to attain a superior product. Laboratory and plant control insure the production of refractories of maximum uniformity in quality, burn, texture and size.

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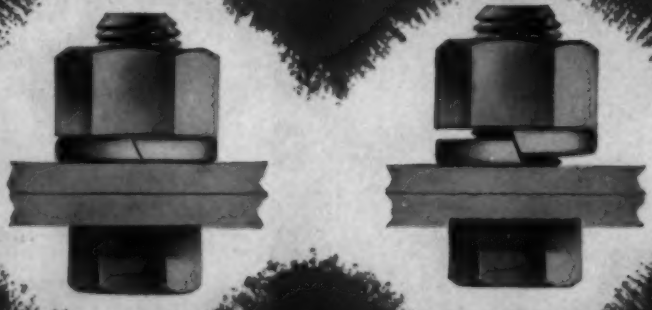
Here's a halfway job — with a fixed nut alone.

— and the nut never moved — it couldn't move, we spiked it to prove our point.

HERE'S A WHOLE WAY JOB, ANY NUT PLUS A KANTLINK SPRING WASHER



BEFORE VIBRATION—IT'S TIGHT

AFTER VIBRATION—IT'S STILL TIGHT

— **still** the nut never moved,—it could not. The spring washer held it tight by expanding as other parts wore, for all parts do wear under vibration and stress.

Only a strong helical **spring** washer can expand and compensate for inevitable wear, bolt stretch, abrasion, lapping, etc. Kantlinks prevent dangerous loosening of all bolted assemblies.

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Write today for descriptive folder.

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TRADE MARK

the long-range Spring Washer

THE NATIONAL LOCK WASHER COMPANY
NEWARK, N. J., U. S. A.

YOU CAN HELP YOUR STEEL FOUNDRY

Help You

The steel castings industry—including your steel foundry—is anxious to contribute as largely as possible to war production.

We realize that "plenty—in time" will save many more lives, and bring victory quicker, than "too little—too late."

Yet so great are the wartime demands for steel castings that most foundries, even with increased facilities, are operating today at full rated capacity or beyond.

The following suggestions are offered in the hope that they may enable the steel castings industry to serve *you* better, and serve America better.

1. *ANTICIPATE YOUR NEEDS*

Specify deliveries of steel castings that meet your schedule requirements. You may penalize another user of castings if you hoard your own supply, or require deliveries far in advance of actual need.

2. *PLAN YOUR DESIGNS*

Many new products are being built to meet the demands of war. In planning something new, it always pays to consult the foundry engineer when making your designs. He can save you money, time and trouble.

3. *PLAN YOUR PATTERNS*

You are seeking the finished result. The foundry engineer knows how to attain that result in the shortest time and at the lowest cost. Use his experience in planning and building your patterns.

4. *SCHEDULE DELIVERIES*

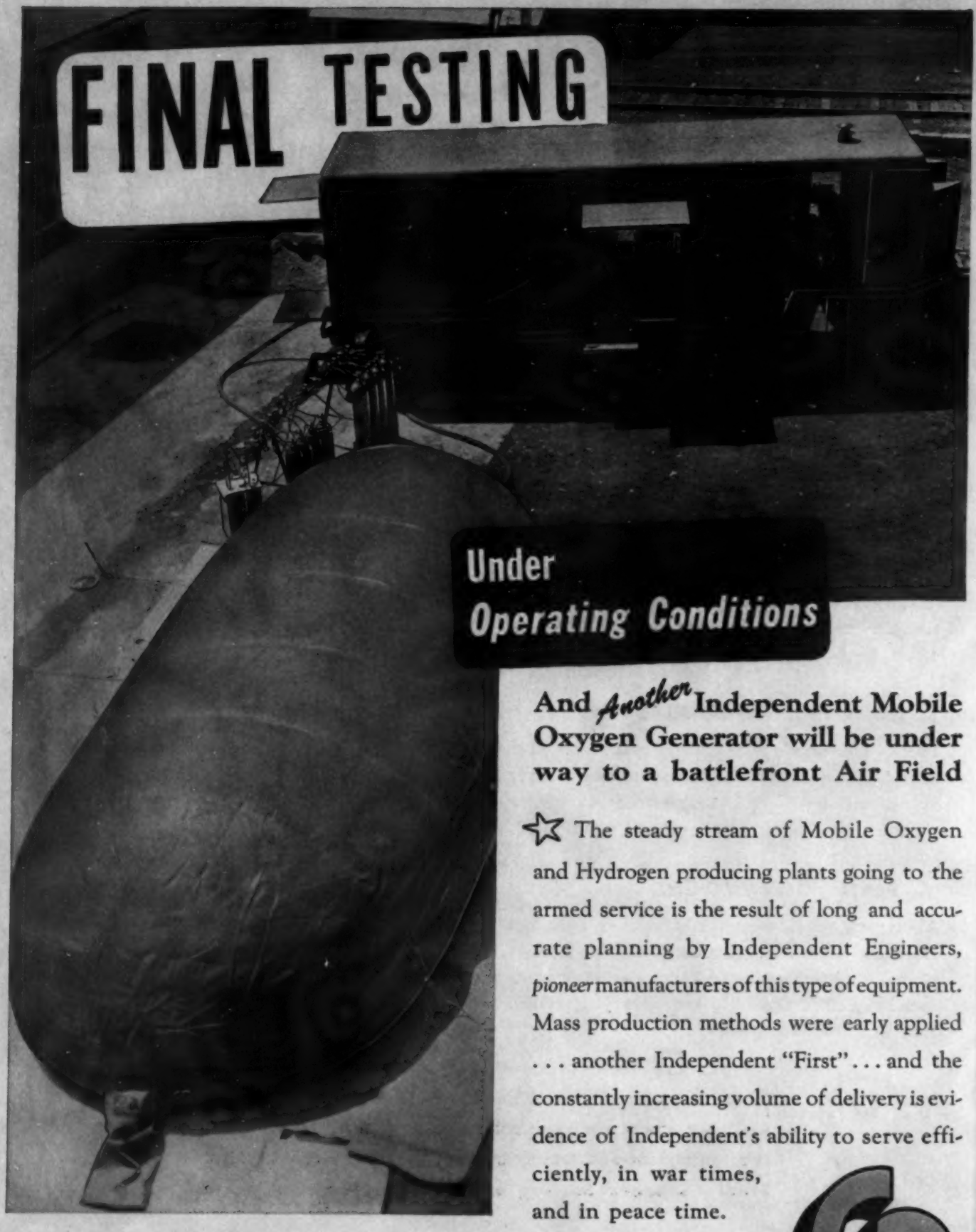
Steel founders are co-operative people. Their one purpose is to help you produce—up to schedule. Take your foundry into your full confidence, and let them work *with* you instead of merely *for* you.

These suggestions sound like obvious procedures. But in all cases where they are followed, it is noted that there is an adequate and timely supply of sound steel castings.

Steel Founders' Society of America, Cleveland, Ohio

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS



And *Another* Independent Mobile Oxygen Generator will be under way to a battlefront Air Field

☆ The steady stream of Mobile Oxygen and Hydrogen producing plants going to the armed service is the result of long and accurate planning by Independent Engineers, *pioneer* manufacturers of this type of equipment. Mass production methods were early applied . . . another Independent "First" . . . and the constantly increasing volume of delivery is evidence of Independent's ability to serve efficiently, in war times, and in peace time.

Independent Engineering Co.

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REPUBLIC STEEL CORPORATION, STEEL AND TUBES DIVISION, IS THE ONLY PRODUCER OF ELECTRUNITE TUBING

1 UNIFORM DIAMETER
—both O. D. and I. D.

2 UNIFORM WALL THICKNESS
—at every point in the wall**

3 UNIFORM CONCENTRICITY
—from end to end of every length of tube

4 UNIFORM STRENGTH
—throughout the entire tube structure (the weld is as strong as the wall)

5 UNIFORM DUCTILITY
—means greater workability

6 UNIFORM WEIGHT
—assures dynamic balance in finished product

7 SMOOTH, SCALE-FREE SURFACE
—free from laps, slivers, rolled-in scale and other injurious defects

8 UNIFORM WELDABILITY
—no allowance for uneven wall thickness is necessary

9 UNIFORM WORKABILITY
—physical properties are constant**

10 FREEDOM FROM HIDDEN DEFECTS
—both surfaces of the flat-rolled steel are inspected

*** Be sure to consider both "as welded" and "flash-removed" grades, as well as annealed and unannealed, in your plans.*

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WHEN YOU DO THESE SIX THINGS:

1. KEEP INSTALLATION CLEAN

Make periodic inspections daily to see that there is no accumulation of material that has spilled off the belt.

2. USE IMPACT IDLERS . . .

Rubber-tread impact idlers at loading and transfer points will prolong belt life by preventing cutting and bruising.

3. "TRAIN" THE BELT . . .

For efficient operation, keep both the carrying and return runs of a conveyor belt practically centered on the supporting idlers.

4. MAINTAIN THE "TRAINING"

Maintaining the "training" of the belt on the conveyor is assured at all times if self-aligning idlers are used.

5. MAINTAIN BELT TENSION

Proper belt tension eliminates excessive belt sag between idler rolls and prevents unnecessary wear.

6. LUBRICATE PROPERLY . . .

Never over-lubricate idler rolls and other moving parts, for too much lubrication is as bad as too little.

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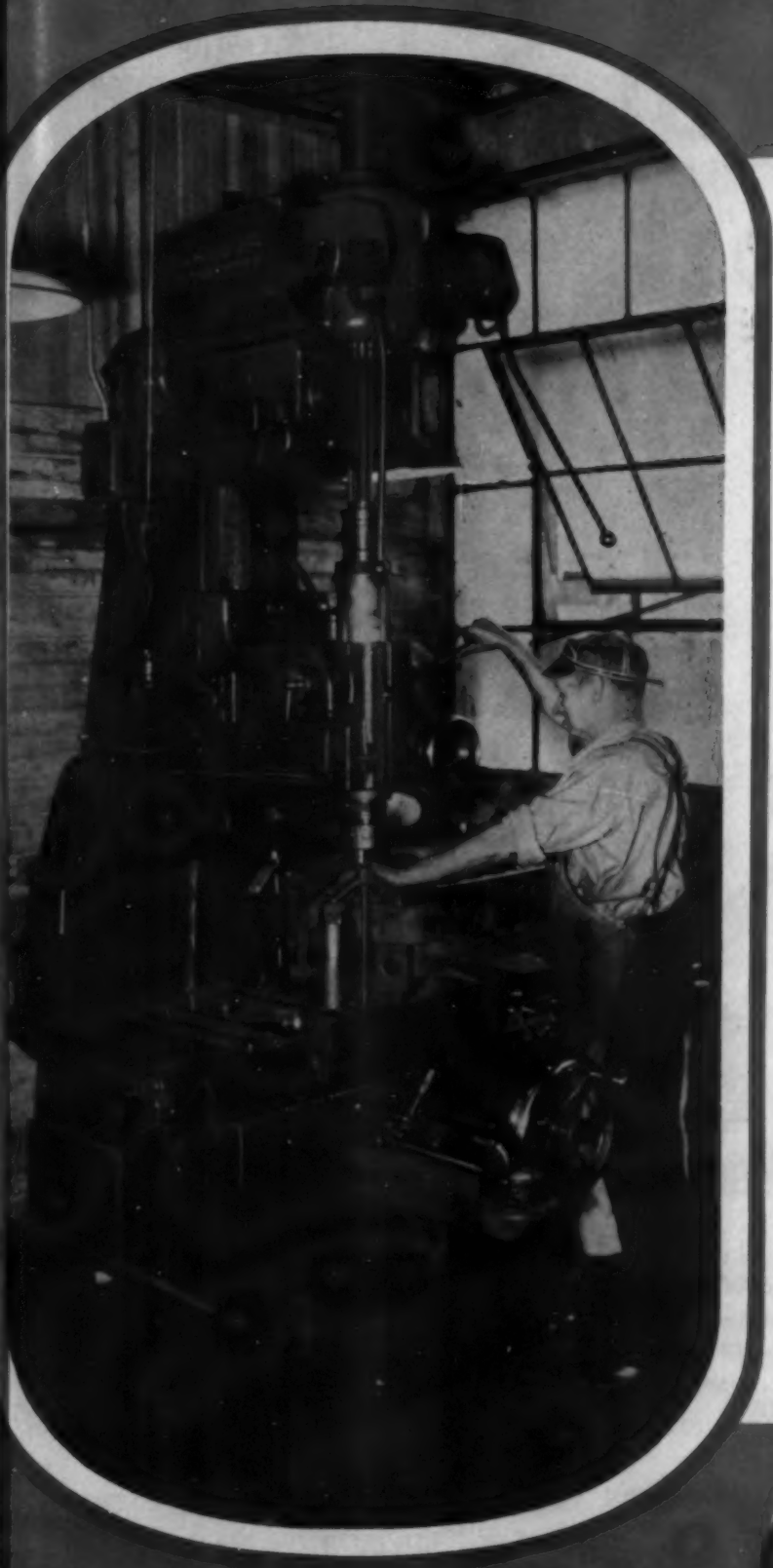
FOSDICK

JIG BORER



combines flexibility and accuracy on a wide range of operations

• The flexibility of this machine comes from practical design and construction which provides exceptional ease of set up and quick change over from one job to another.

Simplicity of operation makes it easy for ordinary shop labor to obtain particularly close tolerance work without special training.

Being used extensively in Tool & Die Shops throughout the nation Fosdick Jig Borers are meeting the needs of precision production of tools—dies—and jigs so essential to our war program.

For the tool room—for the production shop—this machine is adaptable to both types of operation and requires only a moderate investment.

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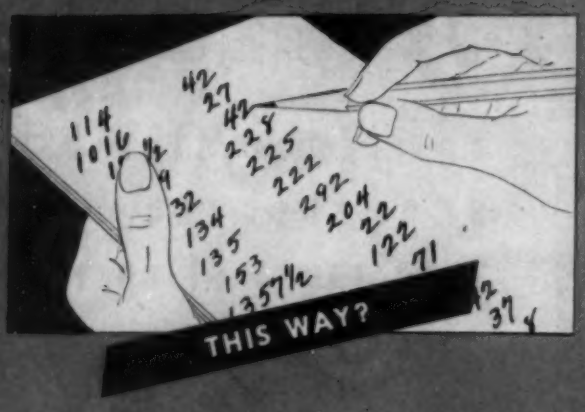
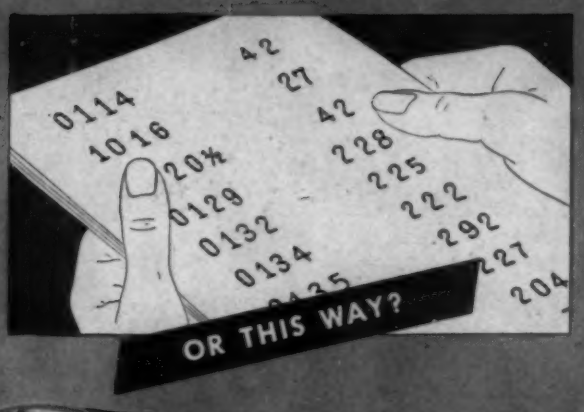
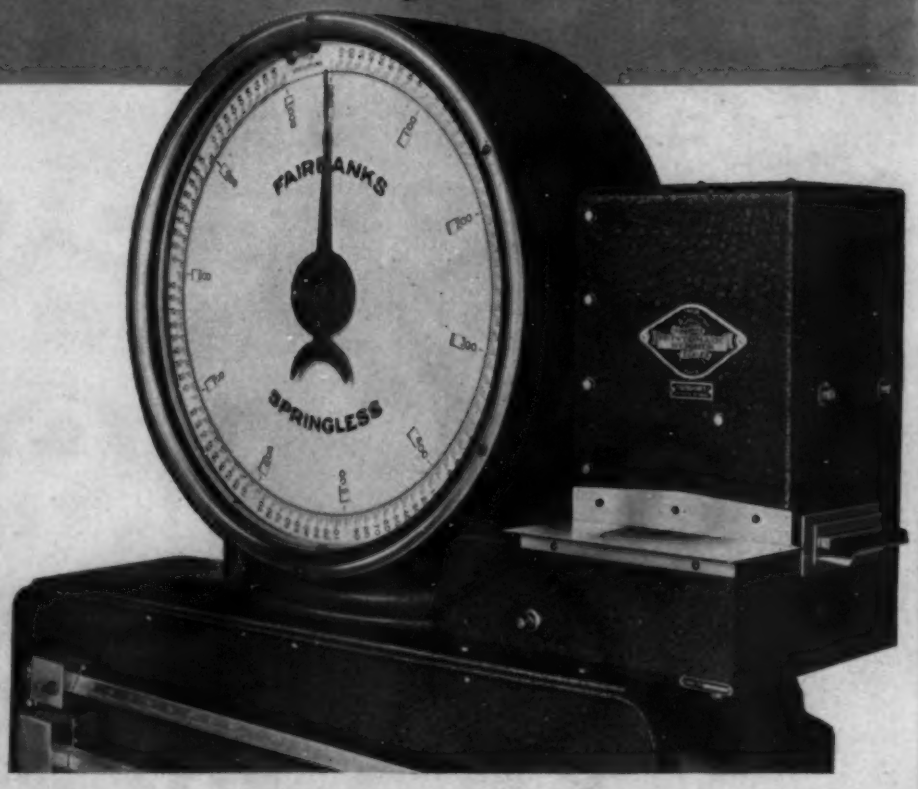
How Are Weight Records Made In Your Plant—







For precision weighing and precision recording use Fairbanks Scales with Printomatics

● Of course, *sustained accuracy* in the weighing machine is vitally important. But no matter how accurate the machine is, unless weights are *accurately recorded,* the element of error still remains.

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AIR CONDITIONERS
RAILROAD EQUIPMENT

Scales

Ingot is removed from soaking pit after being equalized to desired temperatures. Page 49

STEEL

The Magazine of Metalworking and Metalproducing

AUGUST 9, 1943

Volume 113 *Number 6*

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EX-CELL-O CYLINDER BORING MACHINE

To left: **Ex-Cell-O angular type machine equipped with six spindles to finish bore valve seats and valve guide holes in cylinder head of aircraft engine on a production basis. Each spindle is individually adjustable for depth of cut, as are the tools in the boring bars (boring bars, not shown in picture, are piloted in the fixture).**

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. . . for today's production . . . and tomorrow's

For years Ex-Cell-O has been familiarly known as "the headquarters" for special single-purpose machines for turning out accurate parts at a high rate of speed . . . machines that frequently perform numerous operations in one setting of the work and often bring not only a substantial increase in the number of parts produced hourly but also improved quality and reduced unit cost. . . . This is why so many manufacturers have turned to Ex-Cell-O for equipment to meet their war production schedules; why Ex-Cell-O designed machines will figure in the post-war plans of an increasing number of American industries. . . . If you are planning for tomorrow, when the new standards will necessitate costs that are competitive, take advantage of the wide engineering experience and extensive manufacturing facilities that for many years have made Ex-Cell-O a leader in the precision machine tool field.

EX-CELL-O CORPORATION • DETROIT, MICH.

EX-CELL-O SIX-WAY MACHINE

Below: **Ex-Cell-O six-way machine for drilling, broaching and reaming valve guide holes in a magnesium crankcase. This machine is equipped with four standard hydraulic power units and two Ex-Cell-O special hydraulic broaching units.**

XLO

EX-CELL-O *for* PRECISION

Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

STEEL
August 9, 1943

Watch the Pacific Coast!

War has brought an unprecedented upsurge in industrial activity to the West Coast. Aircraft plants, shipyards and light metal industries have attracted workers from all over the country. In three years, industrial employment in the area comprising California, Oregon and Washington has increased by from 200 to 300 per cent. So hectic is the Pacific industrial scene today that native sons refer to it as the second gold rush.

How significant is this second bonanza in less than a century? To what extent can the West Coast retain its wartime ascendancy after peace comes? What does the future hold for this far western industrial empire?

STEEL sent two of its editors to the West Coast to seek facts to help answer these questions. Arthur H. Allen studied the economic developments of the area. John D. Knox looked into the sources of raw materials and the expanding iron and steelworks facilities. The results of their observations will appear in a series of articles which will begin in next week's issue.

Their findings should prove interesting not only to industrialists on the West Coast but also to producers and manufacturers in the remainder of the country whose business will be affected by developments in the Pacific states.

Before the war, California, Oregon and Washington, with 7.39 per cent of the nation's population turned out 6.73 per cent of its manufactures. If the impetus of war is to place the West Coast in a position after the war to supply a considerably greater portion of the country's manufactures, that fact will be important to everybody concerned with industrial markets.

The factor of population alone will help the Pacific states appreciably. The area will emerge from war with a consumer market of 11,000,000 or more persons. Undoubtedly it will produce a greater proportion of the goods required by its own people than during the prewar days. It will be more "self-contained" than heretofore.

But the spirit of the West Coast will not be satisfied with mere gains in self-sufficiency. It envisions postwar industries whose products will be in demand by consumers in other sections of the United States and in the Orient and other foreign markets.

No one can predict the extent to which this vision will materialize. Editors Allen and Knox found evidence of interesting new potentials—some of which are so promising that one can only say "Watch the Pacific Coast!"

ROB PETER TO PAY PAUL: As a result of the mandatory 48-hour week for the iron and steel industry which went into effect Aug. 1, all but a small percentage of the industry's 600,000 employes are working at a rate of 48 hours or more per week. Those who are working fewer than 48 hours are clerical, maintenance and other workers for whom the employers have claimed exemption.

The compulsory shift to the longer week results in a substantial increase in pay, inasmuch as employes will receive time-and-a-half for all hours over 40 per week. This will further reduce the earnings of steel companies and at the same time will reduce the taxes the steel companies pay into the United States treasury. Higher wages and, to a lesser extent, higher costs of materials, already had cut the first-half earnings of 18 steel companies from $90,489,745 in 1942 to $86,827,257 in 1943. Taxes paid by fifteen steel producers were reduced from $298,844,021 in the first half of 1942 to $235,223,106 in the first half of 1943.

One effect of the wage and hour ruling is to shift

(OVER)

money from earnings, where the government's recovery in taxes is high, to employes' income where the tax recovery is low. The resultant loss in federal revenue must be made up by all of the taxpayers.

—pp. 52, 79

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HIGH-GRADE INSURANCE: Numerous geologists, mining engineers, metallurgists, business executives and others identified with a dozen or more private and government organizations deserve a lot of credit for the present comfortable position of this nation in regard to supplies of manganese and chrome ore.

At the outset of the war emergency these men prepared for the worst. They set out to see what could be done if access to foreign supplies were almost completely shut off. They uncovered large deposits of domestic ores and developed processes for utilizing them.

As it happened, foreign supplies were not shut off. Shipments have been coming from many foreign countries. The American steel industry has and will continue to have ample stocks of these ores. However, if worst came to worst, it is believed the total manganese requirements of the industry could be supplied from our domestic material for a number of years.

This standby domestic low-grade ore is high-grade insurance. —p. 60

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SIMPLE AND EFFECTIVE: Stamped steel landing mats for airplanes, which are playing such an important role in this war, are almost exclusively a contribution of the American steel producing and fabricating industry. The broad idea of a steel mat for airfields originated in the United States army, but the unit perforated steel "plank" which met the army's specifications was developed by a steel company salesman and the planks themselves are being turned out by the mile in 29 steel fabricating shops.

Steel plate, ¼-inch thick, is stamped and punched to form a section or plank 10 feet long and 15 inches wide, weighing only 40 pounds. The planks are designed to interlock. With a little supervision, native laborers in almost any foreign land can put down or take up a landing field made of the planks in a short time.

Simplicity in design, fabrication, transportation, erection and dismantling makes this emergency product one of the outstanding developments of the war.

—p. 112

DOWN TIME UNDER 1%: Any manufacturer who is experiencing chronic lubrication headaches will do well to read the story of how a systematic supervision of lubrication is paying dividends for the Thompson Aircraft Products Co.

With the help of a lubrication engineer the lubrication department evolved a progressive plan of lubrication systems and methods. It assures use of the proper lubricants and provides the necessary checks for seeing that they are applied at the right time. The system also involves simple but effective records which afford the lubrication department a valuable continuous chart of experience. Machine time lost through lubrication failures, based upon productive hours, has been reduced sharply to considerably under 1 per cent.

Incidentally, Thompson Aircraft has abolished the terms "oiler" and "grease monkey." The men and women who lubricate machines and equipment are known as "lubrication servicemen" and "lubrication servicewomen."

This idea deserves universal adoption. —p. 82

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STEEL FOR ESSENTIALS: Everybody will welcome the news that steel is being allocated to permit an increase of 6000 freight cars in the third-quarter carbuilding schedule and the building of 3000 locomotives for delivery up to the end of July, 1944.

Not all of this equipment will go to hard-pressed American railroads. Some of it is tagged for the army, lend-lease and other export. However, the sizable portion earmarked for domestic roads will go a long way toward alleviating shortages of motive power and rolling stock. —p. 53

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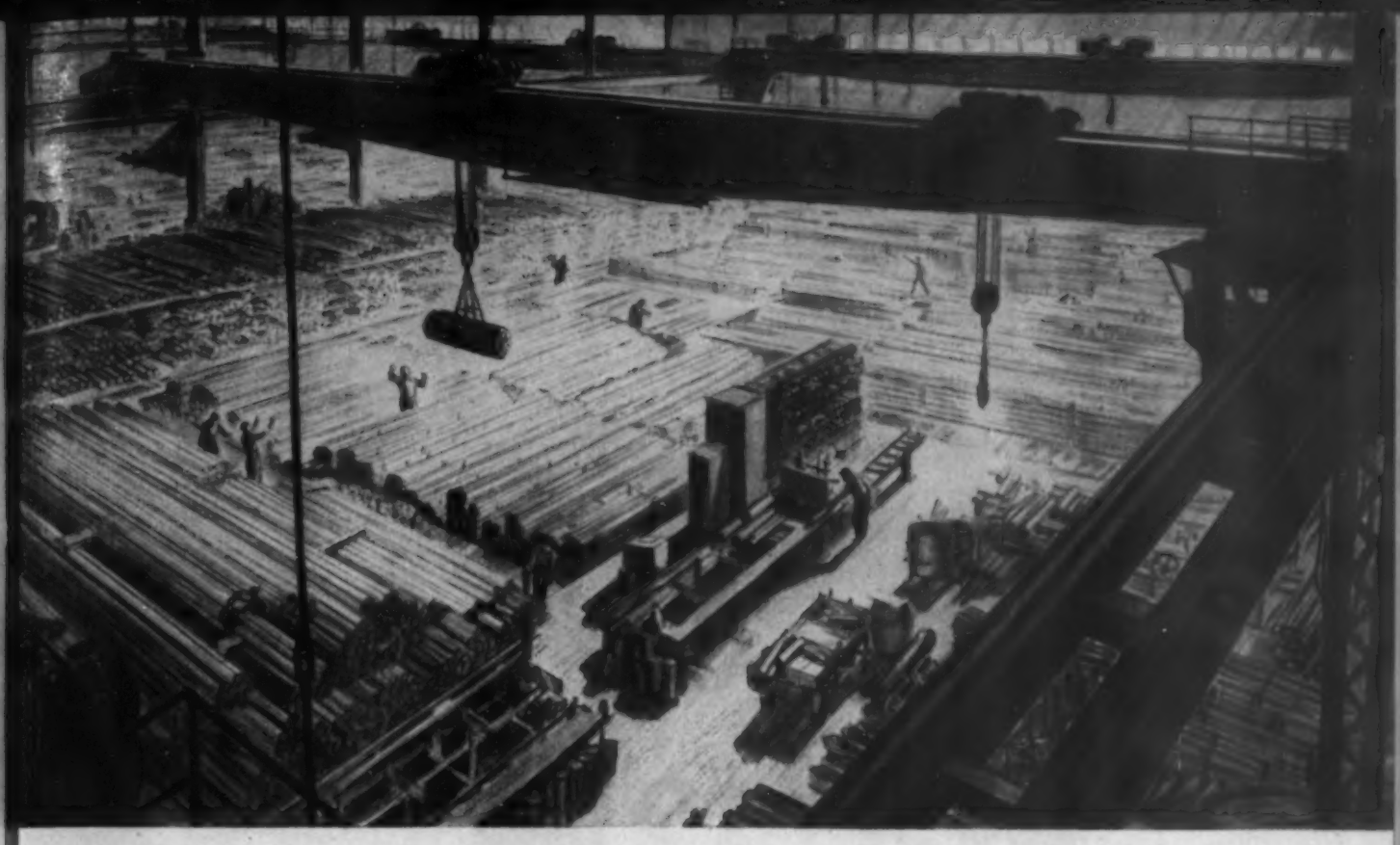
P.S.—While on the subject of allocating steel for essential needs, we wonder if the government knows that its tin can collection program is falling down because housewives can't get can openers at the stores. To flatten a tin can in the prescribed way, one must cut both ends cleanly. This cannot be done with a hatchet or an ice pick. A few tons of steel allocated for can openers might still save the tin can collection drive.

E. L. Shaner

EDITOR-IN-CHIEF



STEEL—In Ryerson Stock

for Immediate Shipment

Ryerson Steel-Service Plants carry every kind of steel to meet your war time requirements. Bars, shapes, plates, sheets, hot rolled, cold rolled, carbon, alloy and stainless are all in stock for quick delivery.

In fact, Ryerson Steel-Service makes it practical to reduce high inventories—eliminate idle steel and make every ton work for victory.

Whether it is a factory breakdown, a rush war order or some other emergency—you can depend on Ryerson.

JOSEPH T. RYERSON & SON, INC.

Plants at: Chicago, Milwaukee, St. Louis, Detroit, Cincinnati, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

RYERSON STEEL-SERVICE

Official photo U. S. Army Signal Corps

DOUBLE TROUBLE... *Gritty Mud and Racking Grind!*

Rurrhr... uhrurrhr... has a familiar ring, hasn't it? And, it wasn't a pleasant sound, was it? Sitting there with your foot on the gas and your hand on the gear-shift, you listened to wear and strain tearing the life out of your car. It was something you always thought about *afterwards*. You probably gave *the car* all the credit for taking the beating . . . never thinking of the bearings that absorbed most of the punishment.

You can bet your bottom dollar, our boys in the Army know how important bearings are . . . for the fellows that push trucks and tanks around know exactly where wear and strain attack. Most of the time, they can't take the *time* to be careful. If a bearing fails, it might mean that a link in an important supply chain is broken. That's why bearings have to be better than good, more reliable than just dependable. To help produce enough of that kind of bearings for the Army, the Navy, and industry here at home is our job. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR

BALL BEARINGS

By R. L. HARTFORD
Pittsburgh Editor, STEEL

WAR GIVES TREMENDOUS LIFT TO ALLOY GRADES

Heavy gains in production capacity and increased utilization seen assuring broad postwar market for high-grade steels. . . Not only will they be more plentiful and better known, but may be less expensive than before the war

ALLOY STEELS face a bright future.

They will be more plentiful in the postwar era. More people will have been educated to their advantages. More people will have been trained to handle them, and more specific data will be available to guide fabricators in choosing the best analysis for the job.

And while it is too early for definite prediction, there are good possibilities they will be less expensive.

The gains to be made by the alloys, however, will not necessarily be made at the expense of carbon steels. Both types will continue to have their respective fields of usefulness. The knowledge acquired by necessity during the emergency may enable the use of carbon steels in applications where alloy steels formerly were considered necessary.

While the war program increased the applications of alloy steels and prompted vast expansion in producing facilities, the shortage of alloying materials has forced many fabricators and producers into an intensified study of carbon steels and what can be done with them through proper heat treating technique. As a result of these studies, physical properties of carbon steels are being sharpened to a point where they compete with alloys in some applications.

Furthermore, the very nature of postwar markets, if they develop on a scale as foreseen by some of the ablest economic thinkers, will contribute considerably to the use of carbon steels because of the cost angle. Vast increases in production bring into sharper focus the importance of small cost increments, and the lower cost of carbon steels may be the deciding factor in many applications.

On the credit side of the ledger, it must also be pointed out that alloy steels will probably cost less. Large volume production, with its accompanying increase in the number of trained men, will bring about economies in the production of alloy steels which will be passed along to the customer. Increased use of scrap with suitable alloy content can be cited as one factor which will cut

Steel ingot is removed from the soaking pit. In this pit ingots are thoroughly equalized to the desired temperatures required for conversion into slabs, billets, or sheet bars for further conversion. OWI photo

down cost of materials used to produce the alloy steels, and the large increase in tonnage of alloy steels used brings with it a larger volume of scrap.

There is, of course, a middle ground which may provide at least a partial answer to the controversy. This is the range of low alloy steels brought on to conserve critical material during the war period. The NE steels are here to stay, and they will be used widely after the war to supplant both carbon steels and high alloy steels. Because many fabricators were forced to adopt such material, the introduction of these steels has not met the resistance which would be expected during peace times. Where normally a fabricator would be loath to change from an accepted material which provided satisfactory results, under present conditions he has had to go to substitutes, and in many cases these substitutes have proved the equal of former steels, and will continue to be basic to his manufacturing processes. Furthermore, workers are becoming accustomed to such materials, and have developed the technique necessary for their use. Since their introduction in 1942, the NE steels have developed to a point where 20 per cent of all alloy steel is now in the NE range.

Types of Demand Shift

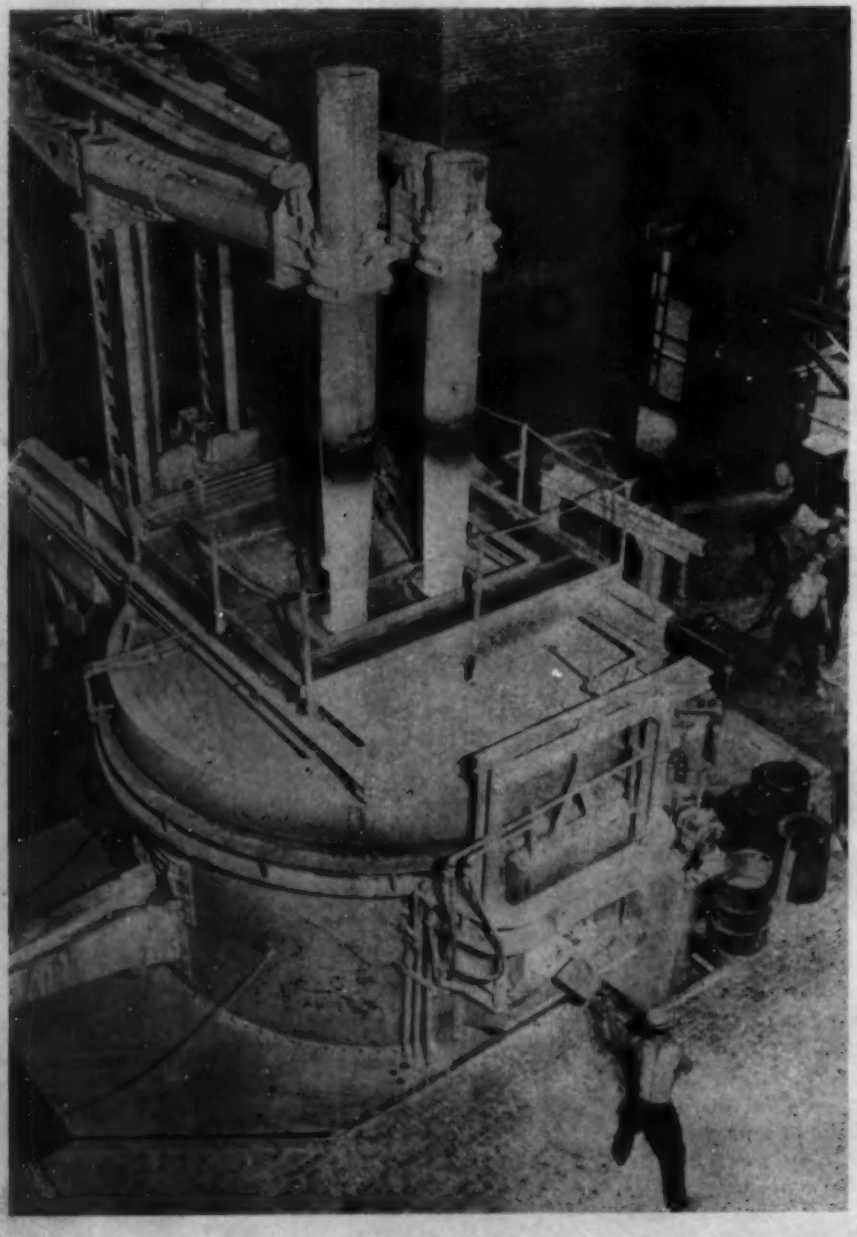
There are other changes brought about by the war in demand for alloy steels. A brief look at the figures for several of the more popular types shows distinct shifts which will probably have some effect on postwar demand patterns. For example, the 2300 series in 1939 accounted for about 5 per cent of alloy production. In 1943 so far it totals only about 0.75 per cent. The 3100 series shows an even more rapid drop during the same period, from 30.48 per cent to less than 1 per cent, while the 3300 series dropped from 8.38 per cent to 4.28 per cent. These three series are nickel and nickel-chromium steels. A look at some of the other varieties shows that straight molybdenum steels of the 4000 series have dropped from 7.16 per cent to 3 per cent, while the chrome-moly steels have jumped from about 8 per cent to 15 per cent of the total. Table 1 shows the relative position of various other grades, including the rapid rise in the NE steels.

Other factors are involved in the demand picture which do not show on the surface of these figures, of course. Probably the primary one is the fact that peacetime articles are not being produced, and in many cases the steel used in war goods is much different from that used in peacetime. As a result, high tonnage items have dropped to nothing, while more obscure analyses are in heavy demand. This does not alter the primary fact that more fabricators are training more men to use low alloy steels, and are becoming well versed in their performance.

So much for the types of alloys which may be expected to come out of the war. Total number of analyses available may be fewer, but the knowledge and experience built up around these grades will also be extensive, and selection of the right steel will not be as appalling a problem to the user as it might have been before the war.

Volume Is Vital Question

What about volume? Is the market for alloy steels going to be large enough to absorb the increased tonnage which will be available? Is the tonnage increase in alloy steels keeping pace with the overall steel expansion, or is it running ahead? How about open-hearth alloys after the war—will the electric furnace become the only means of producing alloys? In the first place, and for the record, expansion in alloy steels since the start of the war is tremendous. In 1915, 3.18 per cent of all steel produced was alloy material. For 25 years alloy production grew right along with the rest of the steel industry, gaining a little here and there, but in 1940 the per cent of alloy steel to the total had reached only 7.52. In the past two and a half years the expansion of alloy steel producing



Electric arc melting furnace in operation. Furnaces of this type convert scrap iron and steel into high quality alloy steel. This type of furnace gives much faster heating and permits the accurate temperature control so necessary in producing high quality steels. OWI photo

Supercharger turbine nozzle box, made of strong and heat-resistant stainless steel, is fabricated with atomic-hydrogen welding. Essential to today's war planes, the design of turbo superchargers presented difficult problems due to the extremes of temperatures encountered. Alloy steels supplied the answer

facilities has been so rapid that estimates show this year's production will reach more than 15 per cent of all steel output, and that in a year which will see more steel produced than in any year in history. Table 2 shows comparative growth of the alloy branch of the industry with total steel production.

Despite a rapid advance in electric furnace capacity, the majority of alloy steel tonnage continues to be made in the open hearth. This is particularly true of the low alloy steels, and in view of the increasing importance of these alloys it may well be that the open hearth will continue to be the bulk producer of these grades of alloy steels.

This is important, because it means that new equipment is not necessary for production of alloy steels. In fact, the exigencies of the war have made it neces-

(*Please turn to Page* 135)

TABLE NO. 1
DISTRIBUTION OF ALLOY STEEL PRODUCTION BY GRADES

SERIES	PERCENTAGE OF TOTAL 1940	PERCENTAGE OF TOTAL 1st. 3 mos. 1943
1300	*	5.85
2300	4.52	0.83
2500	1.43	0.50
3000	1.51	..
3100	19.99	0.86
3200	..	0.35
3300	0.46	4.35
3400	..	0.13
4000	4.13	2.65
4100	9.78	15.93
4300	3.85	6.15
4600	23.68	3.37
4800	3.73	0.46
5000	0.69	0.46
5100	10.49	0.93
52100	9.82	2.94
6100	1.52	0.62
9200	4.38	3.00
N.E. Steels	....	19.43
All Others	....	31.17
TOTAL	100.00	100.00

*Figures not available
Data from "Trends in Alloy Steels", by John Mitchell

TABLE NO. 2
Share Of Steel Production
REPRESENTED BY ALLOY STEELS

YEAR	TOTAL STEEL PRODUCTION—TONS	TOTAL ALLOY STEEL PRODUCTION—TONS	PERCENTAGE OF ALLOY STEEL
1915	36,000,000	1,143,685	3.18
1916	47,000,000	1,526,129	3.25
1917	50,000,000	1,841,655	3.68
1918	49,000,000	2,002,394	4.08
1919	38,000,000	1,658,930	4.39
1920	47,000,000	1,859,527	3.95
1921	22,000,000	906,694	4.12
1922	39,000,000	1,874,316	4.81
1923	50,000,000	2,359,268	4.71
1924	42,000,000	2,269,578	5.40
1925	50,000,000	2,724,930	5.45
1926	54,000,000	2,759,023	5.10
1927	50,000,000	2,835,558	5.67
1928	57,000,000	3,600,698	6.32
1929	63,000,000	4,433,072	7.02
1930	45,000,000	2,736,508	6.07
1931	29,000,000	1,630,623	5.62
1932	15,000,000	894,436	5.95
1933	26,000,000	1,732,845	6.66
1934	29,000,000	1,805,748	6.22
1935	38,000,000	2,374,017	6.25
1936	53,000,000	3,229,657	6.10
1937	56,000,000	3,396,541	6.06
1938	31,000,000	1,653,510	5.34
1939	52,000,000	3,211,955	6.18
1940	66,000,000	4,965,887	7.52
1941	82,000,000	8,206,129	10.00
1942	86,000,000	11,526,374	13.40
*1943	90,000,000	14,000,000	15.56

*ESTIMATED
Data from "Trends in Alloy Steels", by John Mitchell

Present, Past and Pending

■ CHICAGO "SHARE THE STEEL" CANCELLATIONS HEAVY

CHICAGO—More than 140,000 tons of steel on order books of local district mills were canceled in the "Share the Steel" campaign. The figure is expected to reach 160,000 tons when final tabulations are completed.

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■ ELECTRO ALLOYS CO. BOUGHT BY AMERCAN BRAKE SHOE

ELYRIA, O.—Consolidation of the Electro Alloys Co., this city, with American Brake Shoe Co. was announced last week. The Elyria plant will be operated as a subsidiary. Plans for expansion are reported under consideration. Walter G. Hoffman will head the Electro Alloys division, and W. C. Whyte, who has been president of Electro Alloys, will serve as vice president.

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■ BALDWIN PLACES $65,000,000 IN SUBCONTRACTS

PHILADELPHIA—Baldwin Locomotive Works and subsidiaries awarded subcontracts of approximately $65,000,000 on war orders in the first six months of 1943, according to Ralph Kelly, president. This is an increase of about 15 per cent over 1942. Total of 1035 subcontractors located in 28 states and the District of Columbia is sharing in the Baldwin program.

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■ HIGGINS CANCELLATION OFFSET BY NEW CONTRACT

NEW ORLEANS—The Maritime Commission has cancelled its contract with Andrew J. Higgins, New Orleans, for wooden Curtiss C-76 Caravans, but has replaced the cancelled order with a contract for construction of metal Curtiss C-46 Commandos, which the Army has decided are less costly and more efficient than the wooden type.

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■ AMERICAN MERCHANT MARINE HAS MORE THAN DOUBLED

WASHINGTON—American merchant marine increased by 158 vessels during June, bringing total delivered for first seven months this year to 1046, aggregating 10,485,500 deadweight tons. Since Pearl Harbor the merchant marine has grown from 10,500,000 deadweight tons to 26,000,000.

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■ REPORTS $3,555,174,000 SAVED THROUGH RENEGOTIATION

WASHINGTON—A joint report of the Army, Navy, and Maritime Commission price-adjustment agencies states excessive profits of $3,555,174,000 have been eliminated through renegotiation of contracts. By the end of June written or oral agreements had been completed with 3611 war contractors.

Some Exceptions Sought As Steel Industry Goes on 48-Hour Week

War Manpower Commission asked to exempt certain classes of employes where longer week is impracticable. . . Majority of workers on new schedule. . . Overtime estimated to add $100,000,000 annually to payrolls

MANDATORY 48-hour week in the iron and steel industry went into effect Aug. 1 on a nation-wide basis.

While exemptions have been claimed for various classes of employes, for all practical purposes the industry's 600,000 employes now are on the longer work week. Reports from the various steel producing districts indicate exemptions are being sought for certain departments involving mainly clerical, maintenance workers and similar groups.

Extension of the longer week to the entire industry is expected to increase total steel payrolls by $100,000,000 a year. This was the estimate made by the American Iron and Steel Institute earlier this year. The increase will come from the payment of time-and-a-half for more than 40 hours work per week. In effect this is a pay increase, and as such is the third since 1941, resulting in aggregate increase in steel payrolls since that year of approximately $300,000,000 annually. During that time there has been no increase in the composite price of steel products.

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PITTSBURGH—In this district practically every steel company is understood to have applied for exemptions from the compulsory 48-hour work week schedule ordered by the War Manpower Commission. In most cases exemptions are claimed for workers in offices and non-continuous operations.

WMC has been fairly liberal in granting exceptions to supervisory, sales, administrative and clerical workers and in the non-continuous operations. Youths under 18, women, and physically handicapped men also have been exempted from the order after agreement between the United Steelworkers of America and representatives of management. Pat Fagan, local WMC area director, stated that most works have been placed on the 48-hour-week basis. Exemptions will apply on a month-to-month basis and as the manpower supply diminishes, exceptions will be cancelled. In most cases the exemptions have been allowed on a verbal basis subject to approval from Washington.

The Pittsburgh district still has a fair backlog of office workers and is not too hard pressed for common labor, although skilled workers are scarce.

Persons for whom applications for exception have been filed generally will be permitted to work their former work-week until their applications have been processed.

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CHICAGO — Steelmaking operations in this district are at present and for some time past have been as completely on the 48-hour week as it has been possible to place them in view of production quotas. With the 48-hour week compulsory beginning Aug. 1, exceptions are covered by exemptions already filed with the regional WMC office but not yet acted upon. No information is available on the number of exemptions which have been sought, but it is understood the number is large.

Generally, round-the-clock, or continuous operations, such as blast furnace, coke oven and open-hearth departments, have been running on the 48-hour week or longer work-week basis for months. It is in the rolling mills, finishing and clerical departments where plant managers have been unable to arrange the 48-hour minimum.

There are reasons to feel Chicago regional WMC office may be more insistent on full 48-hour week compliance here than in eastern sections. If this proves true, it may enforce its position by ordering the United States Employment Service to stop sending new workers to the mills. The labor supply situation already is critical.

Steel plant managements have placed before WMC considerable evidence supporting the contention certain departments cannot be placed 100 per cent on

RECORD PAYROLLS

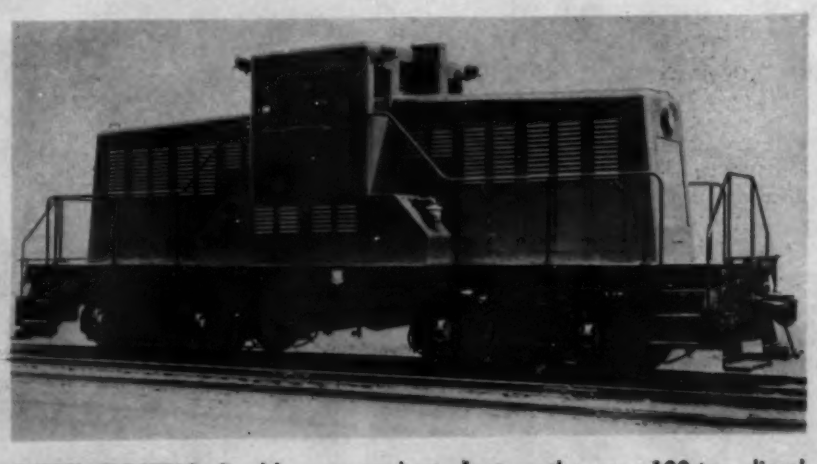
Steel industry payrolls during June were the highest for any thirty-day month on record, totaling $136,217,000, according to the American Iron and Steel Institute.

In May payrolls amounted to $137,404,000 while in June a year ago $118,067,000 were distributed.

Employment declined slightly during the month to 631,000, against 632,000 employes in May and 659,000 in June last year.

Average hourly earnings of wage-earning employes amounted to 112.7 cents in June, compared with 113.4 cents in May and 102.0 cents in June, 1942.

Average number of hours worked per week by all wage-earning employes was 43.3 in June, compared with 41.9 in May and 38.7 hours per week in June a year ago.



DIESEL ELECTRIC: Double power plants feature the new 100-ton diesel electric locomotives designed by H. L. Porter Co. Inc., Pittsburgh. Electric equipment is so designed that with only one engine operating the unit can be used efficiently to carry light loads, traveling as fast as the two engines can travel with a heavy load. Besides gaining economy, the asset of being able to operate with one engine out of service is particularly valuable in remote places, or where there is only one locomotive

a 48-hour week basis. Labor organizations, on the other hand, are insisting upon 48 hours of work for every worker.

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BUFFALO — At least 95 per cent of the Buffalo area's steel industry workers are now working 48 hours or more in accordance with the War Manpower Commission's order. Survey by STEEL's reporter showed two large mills in the area with "100 per cent of our workers" on at least 48 hours a week. Another has an average work-week close to 50 hours, but about 8 per cent of its workers were still putting in less than 48 hours weekly.

Complaints have been registered by labor forces over failure to engage the remaining steel workers the extra eight hours. Also it was reported there was some dissatisfaction in labor circles over the manner in which a worker receives the overtime.

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BIRMINGHAM — Of approximately 20,000 men in the manufacturing departments of the steel industry in Alabama, 80 per cent now are on the 48-hour week and the plan is working smoothly, J. A. Downey, area WMC director, states.

Virtually all of the steel and iron producers in the district have asked for exemptions from the longer work-week for certain classes of employes. According to Mr. Downey, the only exceptions being claimed are in line with allocations of steel directives by WLB.

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CLEVELAND—All but a few of the 84 companies classified as steel interests in the WMC Fifth region—covering Ohio, Michigan and Kentucky—already have complied with general order No. 8 placing the industry on a 48-hour week basis; or they have reached an agreement on certain departmental exemptions.

It is estimated the order affects over 100,000 employes in this region, and will add millions of dollars annually to companies' payrolls.

In general, exceptions from working the 48-hour week have been permitted in those finishing operations where production directives make it impossible to increase operating schedules. However, the majority of companies are operating 48-hours or more each week.

The order does not apply to administrative office forces. In a number of instances companies have been given 30 to 60 days with which to place plant office employes on a 48-hour week basis. A few companies have been granted exemptions in those instances where they are training key men to be the nucleus of the working force in new plants scheduled to be completed this year.

Substantial Locomotive and Car Building Programs Projected

Schedule reported set up calling for construction of 5000 motive-power units for delivery by next July. . . Car program for third quarter enlarged with 6000 units on order. . . Steel tonnage to be provided

RAILROADS are in the news again—this time not for the usual reason of what they lack in the way of equipment, but for what they are going to get. After months of warning by railroad officials, followed by a sharp increase in breakdowns, action is in process to supply substantial number of new cars and locomotives.

A primary need of the carriers has been for more motive power. This locomotive shortage has been building up for several years.

Schedules now have been set up on a construction program that will result in the building of more than 5000 locomotives to be delivered by July, 1944.

Army needs account for a large share of this gigantic program. A sizable number are for the domestic roads and some are for foreign countries, principally South American.

Six locomotive builders and two railroad shops will build these units it is understood. They are: American Locomotive Works, Baldwin Locomotive Works, Lima Locomotive Works, H. K. Porter & Co., Davenport-Besler Corp., Vulcan Iron Works, Norfolk & Western railroad and the Pennsylvania railroad.

The locomotives range in size from small 0-6-0 switch type to giant 4-6-6-6 units used primarily for hauling long coal trains in the southern Appalachians.

Steel requirements for the program are expected to exceed 1,000,000 tons.

An increase in the third quarter car program of nearly 6000 units also has been announced and plans are already under way to assemble the necessary materials. It is understood the War Production Board is reversing an earlier position and will allocate plates through Office of Defense Transportation for construction of these cars.

Plates will be provided, however, with the restriction that the bulk of tonnage comes out of mill accumulations. A large tonnage of the plates required already has been booked.

Following current patterns, cars will be built of noncritical materials insofar as possible and feasible. Cast wheels will be used in all but about 800 cars, mostly 70 ton hoppers, which will be equipped with rolled steel wheels. Wood construction will be used extensively on flats and box cars. Steel for axles has been placed.

The program stipulates that delivery is to be made on 75 per cent of the cars during third quarter. The remaining 25 per cent will carry over into the fourth quarter if necessary. There is also a good possibility that additional cars, possibly as many as 10,000, may be placed in the fourth quarter.

Already in the market with inquiries for fourth quarter cars are at least five railroads—Baltimore & Ohio, Nickel Plate, Chesapeake & Ohio, Erie, and Pere Marquette. Outside of the Baltimore & Ohio, none of these roads shared in the 6000 new third quarter cars. The table below shows a complete breakdown of the car orders by builders and railroads.

DISTRIBUTION OF ORDERS ON THIRD QUARTER CAR PROGRAM

Carbuilder	No. of Cars	Type	Railroad
American Car & Foundry Co.	502	50-ton box	Chicago, Milwaukee & St. Paul
American Car & Foundry Co.	100	50-ton box	Central Railroad of Georgia
St. Louis Car Co.	600	70-ton hopper	Missouri Pacific
Huntington Car & Foundry Co.	200	50-ton hopper	Clinchfield
Bethlehem Steel Co.	150	50-ton hopper	Atlantic Coast Line
Bethlehem Steel Co.	350	50-ton hopper	Baltimore & Ohio
General American Transptn. Corp.	600	50-ton box	Atchison, Topeka & Santa Fe
General American Transptn. Corp.	200	20-ton gondola	Atchison, Topeka & Santa Fe
General American Transptn. Corp.	200	50-ton gondola	Atchison, Topeka & Santa Fe
Greenville Steel Car Co.	165	50-ton flat	Central Railroad of Georgia
Mather Car Co.	62	40-ton gondola	Mather Car Co. (lessor)
Mt. Vernon Car Co.	200	50-ton flat	Denver, Rio Grande Western
Pullman Standard Car Mfg. Co.			
Bessemer, Ala.	400	50-ton box	Atlantic Coast Line
Bessemer, Ala.	100	50-ton box	Birmingham Southern
Bessemer, Ala.	200	50-ton box	Georgia Railway
Butler, Pa.	417	50-ton box	Chicago Northwestern
Chicago, Burlington & Quincy	330	50-ton box	Chicago, Burlington & Quincy
Chicago, Milwaukee & St. Paul	300	50-ton box	Chicago, Milwaukee, & St. Paul
Fruit Growers Express	300	50-ton refrig.	Fruit Growers Express
Reading Railroad	200	50-ton hopper	Reading Railroad
St. Louis Southwestern	150	50-ton box	St. Louis Southwestern

First Half Plate Production Heavy

Averaged 140.4 per cent of capacity. . . Total of all products promises 66,490,146 tons for year. . . June output slightly under May. . . Sheet tonnage sacrificed to plates

PRODUCTION of steel and iron for sale during first half totaled 33,245,073 net tons, almost equally divided between first and second quarters, 16,632,962 tons in first and 16,612,111 tons in second, according to figures by the American Iron and Steel Institute. This rate, if continued during last half, would result in production of 66,490,146 tons for the year.

June total was 5,464,593 tons of steel products, 728,676 tons of pig iron, 79,053 tons of ingot molds and 15,092 tons of iron products, including bars, pipe and tubes. In May steel production totaled 5,586,447 tons, 121,854 tons more than in June, a difference accounted for by the additional working day in May.

Bars represent the largest tonnage, 1,087,241 tons in June, 6,504,598 for six months, 89.9 per cent of capacity in June and 89.2 per cent for first half. Plates are first in point of percentage of capacity engaged, 132.8 per cent in June and 140.4 per cent for the year to July 1. Plate production in June totaled 1,004,005 tons, against 1,067,858 tons in May. For six months plate output aggregated 6,399,825 tons.

Sheet mills, deeply curtailed by conversion of many units to plate production, in June operated at only 62.7 per cent of capacity and turned out 695,833 tons. In first half sheet production was 4,340,519 tons, representing 64.8 per cent.

During first half 2,441,030 tons were shipped to members of the industry for conversion into further finished products.

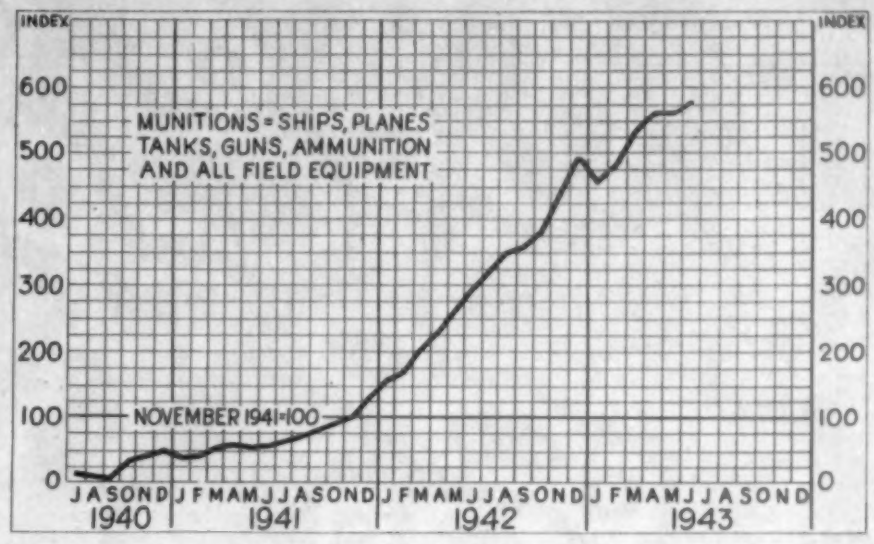
Companies included in these statistics numbered 183, which in 1942 represented 98.8 per cent of total output of finished rolled products. In accordance with government policy export figures cannot be published and these columns are blank in the accompanying table, which supplies full statistics for June and first half, 1943.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products — JUNE - 1943

		No. Furnaces Included	Line	Annual Capacity Net Tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	44	1	xxxxxxx	889,551	xxx		188,283	4,079,568	xxx		1,174,127
	Heavy structural shapes	10	2	5,412,580	279,717	62.8		xxxxxxx	1,886,415	70.2		xxxxxxx
	Steel piling	4	3	338,000	4,660	16.8		xxxxxxx	14,064	8.4		xxxxxxx
	Plates—Sheared and Universal	21	4	9,189,740	1,004,005	132.8		2,169	6,399,825	140.4		19,380
	Skelp	6	5	xxxxxxx	65,648	xxx		34,228	401,239	xxx		211,929
	Rails—Standard (over 60 lbs.)	4	6	3,629,260	145,589	48.8		xxxxxxx	893,169	49.6		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	15,243	59.8		xxxxxxx	81,759	53.2		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,021	12.2		xxxxxxx	12,887	25.5		xxxxxxx
	Splice bar and tie plates	13	9	1,120,270	51,991	56.4		xxxxxxx	323,873	58.3		xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	570,295	xxx		80,934	3,548,636	xxx		472,892
	Concrete reinforcing—New billet	15	11	xxxxxxx	41,315	xxx		xxxxxxx	214,153	xxx		xxxxxxx
	Rerolling	16	12	xxxxxxx	10,028	xxx		xxxxxxx	47,301	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	145,509	xxx		xxxxxxx	877,532	xxx		xxxxxxx
	Alloy—Hot rolled	20	14	xxxxxxx	264,382	xxx		37,700	1,525,007	xxx		229,188
	Cold finished	19	15	xxxxxxx	44,002	xxx		xxxxxxx	240,437	xxx		xxxxxxx
	Hoops and baling bands	4	16	xxxxxxx	11,710	xxx		xxxxxxx	51,332	xxx		xxxxxxx
	TOTAL BARS	63	17	14,696,525	1,087,241	89.9		118,634	6,504,598	89.2		702,080
	Tool steel bars (rolled and forged)	17	18	200,840	19,231	116.4		xxxxxxx	119,787	120.2		xxxxxxx
	Pipe and tube—B. W.	15	19	2,231,040	109,316	59.7		xxxxxxx	655,017	59.2		xxxxxxx
	L. W.	8	20	845,400	47,662	68.8		xxxxxxx	288,911	67.4		xxxxxxx
	Electric weld	8	21	1,149,250	95,298	100.8		xxxxxxx	519,395	91.1		xxxxxxx
	Seamless	15	22	3,082,400	168,848	66.6		xxxxxxx	1,061,468	69.4		xxxxxxx
	Conduit	7	23	190,000	5,291	33.8		xxxxxxx	31,362	33.3		xxxxxxx
	Mechanical Tubing	11	24	597,800	61,573	122.2		xxxxxxx	375,676	126.0		xxxxxxx
	Wire rods	22	25	xxxxxxx	102,266	xxx		19,666	597,871	xxx		118,833
	Wire—Drawn	41	26	2,366,150	160,653	82.5		5,167	975,267	83.1		29,077
	Nails and staples	19	27	1,116,640	67,560	73.5		xxxxxxx	424,581	76.6		xxxxxxx
	Barbed and twisted	15	28	482,280	21,062	53.1		xxxxxxx	122,087	51.0		xxxxxxx
	Woven wire fence	16	29	778,060	21,450	33.5		xxxxxxx	106,402	27.6		xxxxxxx
	Bale tie	12	30	128,420	10,404	98.5		xxxxxxx	55,486	87.1		xxxxxxx
	All other wire products	8	31	78,220	5,039	78.3		xxxxxxx	31,088	80.1		xxxxxxx
	Fence posts	11	32	112,065	2,893	31.4		xxxxxxx	11,868	21.3		xxxxxxx
	Black plate	10	33	339,700	27,766	99.3		-	147,902	87.8		
	Tin plate—Hot rolled	4	34	483,620	1,383	3.5		xxxxxxx	9,551	4.0		xxxxxxx
	Cold reduced	10	35	3,841,340	218,607	69.2		xxxxxxx	1,076,229	56.5		xxxxxxx
	Sheets—Hot rolled	25	36	xxxxxxx	474,993	xxx		19,879	3,017,737	xxx		100,236
	Galvanized	14	37	xxxxxxx	64,739	xxx		xxxxxxx	401,889	xxx		xxxxxxx
	Cold rolled	14	38	xxxxxxx	124,089	xxx		xxxxxxx	737,825	xxx		xxxxxxx
	All other	14	39	xxxxxxx	31,992	xxx		xxxxxxx	183,068	xxx		xxxxxxx
	TOTAL SHEETS	28	40	13,497,570	695,833	62.7		19,879	4,340,519	64.8		100,236
	Strip—Hot rolled	22	41	3,200,890	121,548	46.2		14,232	765,901	48.2		65,365
	Cold rolled	39	42	2,057,340	98,672	58.3		xxxxxxx	568,121	55.7		xxxxxxx
	Wheels (car, rolled steel)	5	43	624,820	17,576	50.3		xxxxxxx	111,863	53.1		xxxxxxx
	Axles	6	44	453,470	13,189	35.3		xxxxxxx	83,294	37.0		xxxxxxx
	Track spikes	11	45	308,350	12,444	49.0		xxxxxxx	76,064	49.7		xxxxxxx
	All other	5	46	42,000	13,969	404.2		xxxxxxx	99,937	479.6		xxxxxxx
	TOTAL STEEL PRODUCTS	159	47	xxxxxxx	5,464,593	xxx		402,258	33,245,073	xxx		2,441,030
	Pig iron, ferro manganese and spiegel	26	48	xxxxxxx	728,676	xxx		355,637	4,585,259	xxx		2,142,385
	Ingot molds	5	49	xxxxxxx	79,053	xxx		xxxxxxx	479,269	xxx		xxxxxxx
Iron Products	Bars	10	50	170,110	7,965	56.9		298	49,212	58.5		1,679
	Pipe and tubes	2	51	106,000	6,409	73.5		xxxxxxx	43,686	83.1		xxxxxxx
	All other	1	52	56,000	718	15.6		-	7,340	26.4		
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	xxxxxxx	15,092	xxx		298	100,238	xxx		1,679

June Production Gains but Falls Behind Schedule

Intensive effort required to effect small increases with industry in the "stratosphere" as regards output


INDEX
600
500
400
300
200
100
0
MUNITIONS = SHIPS, PLANES TANKS, GUNS, AMMUNITION AND ALL FIELD EQUIPMENT
NOVEMBER 1941=100
J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1940
1941
1942
1943

MUNITIONS production is still going up, but the rate of climb has lessened, Donald M. Nelson, chairman War Production Board, stated last week, reporting a 2 per cent overall increase in June output over that of May.

The production curve shows signs of leveling off, even relatively small gains in some items being obtained only by efforts far more intensive than anything in previous experience.

"America," said Mr. Nelson, "is now in the stratosphere of production, and to reach higher altitudes requires supercharging."

In his report, the twelfth of a series, Mr. Nelson said scheduled requirements for munitions are rising sharply. During June total output, while up compared with May, did not meet schedules.

The following shows the rate of progress of munitions production month by month so far in 1943: January output was 7 per cent below December, 1942; February, 6 per cent above January; March, 9 per cent above February; April, 6 per cent above March; May showed no gain over April; June, 2 per cent above May.

Aircraft production increased 3 per cent in the month. Total ground ordnance and signal equipment rose 3 per cent, with the following specific variations in this category: self-propelled artillery decreased 13 per cent; combat vehicle production increased 2 per cent; artillery (excluding self-propelled) decreased 7 per cent; small arms and infantry weapons increased 14 per cent; naval vessels (value put in place) decreased 3 per cent; merchant vessels (value put in place) increased 11 per cent; miscellaneous munitions increased 1 per cent.

Airplane production fell short of expectations. Increase over May was 3 per cent on a weight basis. Total acceptance, while over 7000, rose only slightly in number from May to June.

Merchant ship deliveries were down about 100,000 deadweight tons from the May record of 1.8 million.

June naval tonnages delivered reached a new peak of 229,457 displacement tons, 13 per cent above May.

Segments of the Army program are lagging. Ammunition and most components are in abundant supply, and schedules have been cut back.

Net orders for machine tools, new orders less cancellations, declined during the month to $38,322,000, a 21 per cent decrease from May. Shipments amounted to $108,689,000, drop of 5 per cent from May.

Accumulated backlog of unfilled machine tool orders was $511,478,000 at the end of June. At the June rate of shipments, this backlog would be eliminated in 4.7 months.

Government-financed war construction completed in June is estimated at $1,010,000,000, decrease of 4 per cent from the revised May total of $1,050,000,000.

MUNITIONS PRODUCTION INDEX
(November 1941 = 100)

Month	1940	1941	1942	1943
January	...	41	160	457
February	...	45	173	483
March	...	52	202	530
April	...	60	233	563
May	...	57	265	563
June	...	59	293	580
July	23	64	321	...
August	22	72	350	...
September	22	83	365	...
October	27	91	386	...
November	34	110	436	...
December	50	1133	496	...

Wilson Says Last Half Munitions Output Must Increase 30 Per Cent

WHILE all has been going better than anticipated on the battle front, this country has more to fear from over-confidence and optimism than from Hitler and Tojo, Charles E. Wilson, executive vice chairman, War Production Board, told 1000 industrial executives from the New York metropolitan area at a meeting in that city, Aug. 3.

War production schedules in the first half, Mr. Wilson declared, amounted to only 43 per cent of the year's program. Thus, if the goal for 1943 is to be achieved there must be an increase in the current half of almost 30 per cent over the first six months.

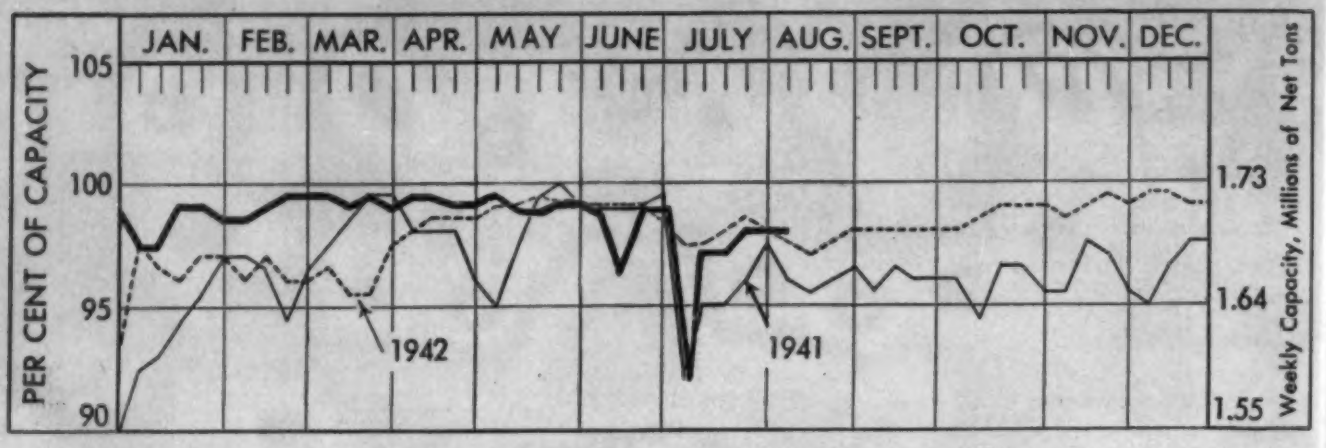
Lt. Gen. Brehon H. Somervell, chief, Army Service Forces, pointed out May production was 5½ per cent below schedule, June showed no improvement, and that preliminary reports for the first 20 days of July showed a further reduction in output. There must be a shift in this trend, he declared, for military successes, such as the Allies are now experiencing, only quicken the need for implements of war.

Mr. Wilson suggested that plant managers re-examine their production quotas, and see whether, in terms of all available plant, materials and manpower, it might not be possible to increase these quotas.

He suggested also that the plant managements make sure that the workers clearly understand the importance of their work. It must, he said, be driven home to each worker, individually, "that any needless absence from his job may in the near future bring a terrible penalty for some young American facing the enemy overseas."

Asserting that there are labor-management committees in approximately 2300 plants throughout the country, Mr. Wilson said that such committees are playing an important part in cutting down absenteeism and promoting production.

STEELWORKS OPERATIONS



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,826	7,670	7,374	7,545	7,027	....	....	....	....	....	....
1942	7,112	6,512	7,392	7,122	7,382	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150
					PIG IRON PRODUCTION							
1943	5,194	4,766	5,314	5,035	5,178	4,836	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,551	4,766	4,784	4,721	4,860	4,707	5,014

Iron Output Up 7%

Value $1,227,389,689 at furnace. Pennsylvania made 31 per cent of total; Ohio, 22

DOMESTIC production of pig iron, exclusive of ferroalloys, increased 7 per cent in 1942 over 1941 and established a new record, Bureau of Mines reports. Total output in 1942 was 59,077,593 net tons. Pennsylvania was the largest producer with 18,064,888 tons, 31 per cent of the total. Ohio was second with 13,140,362 tons, 22 per cent. Other large producers were, Indiana, 6,430,820 tons; Illinois, 5,850,070 tons; Alabama, 4,081,710 tons; New York, 4,040,756 tons.

Pig iron shipments, also exclusive of ferroalloys, gained 7 per cent over 1941, totaling 59,100,601 tons, valued at $1,227,389,689. This value represents approximate amounts received f.o.b. furnaces and does not include freight costs, selling commissions and other items figured in market prices generally quoted.

Basic iron production was 44,317,871 tons, bessemer 8,892,477 tons, foundry 2,656,089 tons, malleable 2,455,295 tons, low phosphorus 520,642 tons, charcoal 104,813 tons and all others, not ferroalloys, 153,414 tons.

Production of pig iron in 1942 required 104,055,422 tons of iron ore and manganiferous iron ore, 6,368,611 tons of mill cinder and roll scale and 1,372,599 tons of purchased scrap, an average of 1.892 tons of metalliferous materials, exclusive of home scrap and flue dust, per ton of pig iron produced. Because of low grade ore used in Alabama, furnaces in that state used more ore per ton of pig iron than in any other district, averaging 2.537 tons of metalliferous material for each ton of pig iron.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Aug. 7	Change	Same Week 1942	Same Week 1941
Pittsburgh	100	+ 1	93.5	100
Chicago	98	— 0.5	100.5	100.5
Eastern Pa.	93	None	95	95.5
Youngstown	98	None	94	98
Wheeling	94	+ 5	84.5	93
Cleveland	94	— 2	96	92.5
Buffalo	83	— 7	90.5	90.5
Birmingham	95	None	95	90
New England	97	None	95	87
Cincinnati	89	+ 3	92	87
St. Louis	89	— 3	98	98
Detroit	89	None	88	83
Average	98	None	*97.5	*96.0

*Based on steelmaking capacities as of these dates.

American Steel & Wire Co. Creates Research Division

Creation of a Sales Research and Development division headed by W. H. Cordes, advertising manager of the company, was announced last week by American Steel & Wire Co., Cleveland, subsidary of the United States Steel Corp., New York.

The new division will study postwar markets for existing products of the company and will study and investigate effect of use of substitute materials and new application of old ones. In addition, it will explore new ideas for new products and possible new uses for normal products.

Also to be considered is the possible need for altered distribution and merchandising methods.

Ingot Rate 98%

Strike at Buffalo cancels gain at other points. Several changes in blast furnaces

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week remained unchanged at 98 per cent of capacity. Three districts advanced, four declined and five were unchanged. A year ago the rate was 97½ per cent; two years ago it was 96 per cent, both based on capacities as of those dates.

A strike at Wickwire Spencer Steel Co., Buffalo, caused a sharp cut in production, three open hearths being interrupted and two blast furnaces were banked.

Carnegie-Illinois Steel Corp. blew in its Ohio No. 5 blast furnace July 29 after being down since July 14 for patching. Carnegie also blew out its No. 4 stack at South Chicago July 29 for relining. The only other idle stack in the Chicago district is Carnegie's No. 3 at Gary Works, also being relined. Three stacks are idle in the Birmingham, Ala., district.

Fourth Quarter Requests For Steel Top Supply

The overall War Production Board Requirements Committee last week took action on fourth-quarter allotments.

Requests for carbon steel for the fourth quarter are reported 4,200,000 tons in excess of probable supply, while alloy requests are 250,000 tons over prospective supply.

War Department Says Rumors of Further Cancellations Unfounded

Increased emphasis on airplanes, landing mats, prefabricated bridges, road-building equipment seen but no further reductions in existing contracts are in prospect because of recent battle experience

REPORTS circulating to the effect additional heavy cutbacks in military equipment orders are impending as a result of experience gained in the North African and Sicilian campaigns were declared absolutely without foundation by War Department officials last week.

Cutbacks will continue to develop in various military items as the war goes on and manufacturers will be affected by them. These cutbacks will in turn affect demands for forgings, machine operations, etc. But nothing in the way of drastic cancellation of contracts is in the cards as the result of recent experience in North Africa and Sicily.

It was pointed out the tank program was cut back last October and that various adjustments in anti-aircraft and munitions contracts were made. These adjustments were due to the fact production had far exceeded expectations and need for additional equipment was not pressing.

No Heavy Cuts Expected

At the same time it was emphasized by War Department officials that no additional heavy cuts are in prospect.

Military experience in recent months, including the campaigns in North Africa and Sicily, has developed some new angles which it is likely may lead to increased emphasis on equipment requirements.

Increased emphasis is expected to be expended on production of airplanes and mobile equipment. Need for temporary airplane landing fields and the building of roads over which mobile equipment can be moved rapidly is expected to bring about an increased demand for equipment to prepare landing fields and roads. For example it is rumored in the trade that a new landing mat program will be launched in the fourth quarter involving several hundred thousand tons of steel.

Increased production of prefabricated bridges also is said to be in prospect.

In still another direction, it is reported emphasis on road building and other construction machinery will be increased since efficiency of a mechanized army is stepped up in direct ratio to the condition of the roads over which mobile equipment must travel, and to the adequacy of landing fields, etc.

Practically all new construction equipment manufactured during the past year has been sent overseas, often to the actual battle front in advance of, or in support of the infantry. A report made by the War Production Board's Construction Machinery Division shows peacetime construction equipment is a prime necessity in actual battle.

H. G. Batcheller, WPB operations vice chairman, commenting on the report said:

"Bulldozers are used extensively to hammer rough paths for the heavy guns, and have on occasion actually operated as prime movers to haul guns into position.

"When airfield runways are bombed, engineers must have—on the spot and when they need them—track-laying tractors, cranes, shovels, graders, bituminous and concrete machinery, and jaw and roll crushers.

"When artillery-shattered streets have to be cleared to permit passage of vehicles, temporary bridges or new roads built, emergency dockage and unloading facilities set up—these and other types of construction machinery go to work; another example of the products of peace that have gone to war and are doing a vital job.

"A year ago, we were faced with the knowledge that huge quantities of construction equipment would be needed overseas for these purposes. At the same time, large quantities would still be needed at home for essential activities.

"The War Production Board, therefore, acted to screen all home front requests for new construction machinery, and at the same time instituted a 38-state pooling arrangement for the loan and purchase of used machinery of this type."

The result has been, Mr. Batcheller said, that $75,000,000 worth of equipment more than would otherwise have been available is doing a job on many war fronts.

Domestic needs are being covered mainly by used and rebuilt equipment.

DRIVE SUCCESSFUL

Up to late last week, 812,000 tons of steel on mill order books had been cancelled in the "Share the Steel" campaign. Of the total, 80 per cent was for third quarter and the remainder for fourth.

The campaign, a part of the "Steel for Victory" drive, has now been concluded and is described as very successful. Norman W. Foy, assistant director, War Production Board's Steel Division, last week gave a dinner at the Mayflower hotel in Washington for officials of the division who participated in the "Share the Steel" campaign.

WPB is hoping that the balance of the 2,000,000 additional tons required for the war effort in the last half of the year will be obtained through increased output of existing steelmaking facilities, as well as the bringing in of new capacity now under construction.

Steel Committee Discusses Industry's War Problems

The Steel Advisory Committee met in Washington Aug. 4 with the War Production Board's Iron and Steel Division officials. The committee and key officials of the Steel Division later visited the Proving Grounds at Aberdeen, Md., as guests of the Army Ordnance Department.

At the meeting the committee discussed ferroalloys, the "Share the Steel" program, scrap, steel expansion program, and the CMP fourth-quarter report.

It also decided that the steel companies will carry on their own mass meetings with respect to production stepup and WPB will not participate unless specifically asked for speakers.

The scrap report was not optimistic, especially as regards manpower in yards. Reports on the steel expansion program were optimistic.

New Scrap Drive Expected

The War Production Board's Salvage Division last week was reported revamping its program with the idea of possibly putting on another scrap drive early this fall along the lines of that last year. However, it is believed that if such a drive is held it will be for industrial scrap rather than household scrap.

WINDOWS of WASHINGTON

Things Going Better

The way things are going in this war is reflected in the atmosphere encountered in various government agencies. When one visits almost any of the strictly war agencies, such as the War Production Board, or the Army or the Navy, the one-time intense activity and excitement, with working days usually extending far into the night, no longer is noted.

One reason is that Congress is in recess; Washington always calms down to some extent when Congress is away. But the principal reason is that the war agencies have gotten thoroughly organized. They know what their jobs are and how to get them done. As the progress of the war brings shifts in strategy, the war agencies quickly adjust themselves and go along smoothly as a rule. In short, the war is going well.

In sharp contrast is the atmosphere that prevails in the agencies that have to do with civilian economy. The Office of Price Administration, the War Labor Board, the War Food Administration, the War Manpower Commission and a number of other agencies created to guard the home front still are without clear-cut programs.

Use Substitutes!

The ninth "Material Substitutions and Supply List" of the Conservation Division, War Production Board, just issued, reports these metals or metal products are unavailable in sufficient quantities for war demands alone or for war plus essential industrial demands, and recommends use of substitutes whenever possible: Bismuth, cadmium, tin, copper, zinc, tantalum, molybdenum, nickel, columbium, chromium-nickel stainless steel, straight chromium stainless steel, seamless steel tubing, steel forgings and steel bars 1½-inch and larger.

New OPA Policy Pends?

Chester Bowles, new general manager of the Office of Price Administration, told a press conference he proposes to strip price, rent and rationing officials of much of their present authority. At present these officials not only develop OPA programs but they administer them. Regional directors, now largely figureheads, are to administer them. The idea is to administer OPA rulings more intelligently by on-the-spot contacts.

"If you are a businessman, you don't want to be haled into court for a couple of mistakes made by high school girls working for you," Mr. Bowles explained. "On the other hand, you are certainly going to dislike OPA if it allows the store across the street to run a black market."

Mr. Bowles said he favored price subsidies. "Subsidies are a necessary evil," he said, but "chaos would result if they were not used."

Also, he favors overall rather than piecemeal price control.

Seek Production Spur

The *Labor-Management News* is the title of a new weekly to circulate among members of plant labor-management committees. The publication of the War Production Drive Division, War Production Board, is aimed at stimulating still further the activities of these committees in finding new ways of stepping up output.

Organization of these committees has proved to be among the most resultful measures making for more effective and efficient use of plant facilities, of labor, and of materials.

HOW IT WAS NAMED

Of interest to many readers of STEEL should be the origin of the name of the Foundry Methodist Church, one of Washington's leading religious institutions. When the British set fire to Washington in the war of 1812, one of their objectives was the destruction of a foundry in nearby Georgetown where a patriot named Henry Foxall was manufacturing supplies for the American army. Foxall was not only a foundryman but was also a Methodist preacher. He vowed if his foundry were preserved "in order that it might continue to furnish the instruments of war to make tyranny tremble", he would build a Methodist chapel.

A terrific electrical storm halted the British and before they were in a position to raze the foundry American reinforcements were brought up from Virginia, thus ending the threat.

While the church was being built Bishop Francis Asbury settled a debate as to its name by deciding on the Foundry Methodist Church, not only in tribute to the foundry operated by Mr. Foxall, but also because John Wesley at one time had preached in an abandoned foundry in London.

Need Program

Under discussion in administrative circles is a plan to meet Eastern fuel oil requirements after the war by importing fuel oil from Latin America. Under the Good Neighbor policy, the government is in need of a good peacetime import program. The administration also wants to keep our merchant marine strong and wants to make us of our huge tanker fleet instead of scrapping it. The disposition of the administration to find ways of conserving our dwindling supplies of petroleum also is a factor. The conservation policy is favored by most large oil producers.

Hot Potato

How to get labor unions and employers to obey rulings of the National War Labor Board is the hottest potato the administration now has in its hands. The Smith-Connally act, while giving greater power to the board, does not compel a union or an employer to accept a board finding.

Not Much Chance

Plans to "integrate" all forms of public transportation were disclosed at a recent hearing of the Senate Interstate Commerce Committee. All forms of transportation, it appears, would be zoned throughout the country and collected into single ownership and control in each zone.

Under the Transportation Act of 1940, a Board of Investigation and Research held hearings in July of 1942 but its investigations were not disclosed prior to recent hearings which were held by the Interstate Commerce Committee of the Senate.

Testimony included a recommendation by Donald M. Conn, Chicago, executive vice president, Transportation Association of America, that the country's 38,000 truck lines, 4700 bus lines, 2600 water lines, 500 short-line railroads, 139 trunk-line railroads and 20 airlines be integrated. The Association was identified as a "non-political, nonpartisan educational and research organization of 4000 corporations and 20,000 individuals." Air transport, water and motor truck carrier representatives, however, see it as a front for a railroad lobby. The Department of Justice strongly opposes the idea of integration on the grounds it would set up monopolies.

There is small likelihood Congress would pass any legislation that would make it possible to carry out the integration program proposed.

The Blanchard No. 18 is a Consistent Profit Maker on Flat Surface Work

"PUT IT ON THE BLANCHARD"

Large work of thin section is usually difficult to grind. Here the Blanchard method of surface grinding shows to full advantage — the work is held on the magnetic chuck and the wheel takes broad cuts over the surface at each pass. This results in greater accuracy, finer finish, and better production — the Blanchard grinds metal at all times — not air.

Above, a No. 18 Blanchard is grinding 18″ x 24″ steel engine end plates of thin section. .020″ of stock is ground off each side to limits of ±.002″ at a production of 7 plates (14 surfaces) per hour. Note also the variety of other parts which is ground on this machine.

The BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASS.

BLANCHARD

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- Production
- Adaptability
- Fixture Saving
- Operation Saving
- Material Saving
- Fine Finish
- Flatness
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. . . . . *Especially valuable on jobs like the one illustrated.*

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

Supply Position Comfortable as Developments Improve Outlook

Initial shortage fears removed with access to foreign sources maintained. . . Because of favorable overall conditions and other factors many domestic properties are not likely to be developed at this time. . . Chrome ore situation similar

INITIAL fears that supplies of manganese ore might prove insufficient to enable us to fight the war with the full output of our total steelmaking capacity have proved groundless.

Our present situation in manganese ore is a comfortable one. It will continue so—unless the war stretches out over an interminable period, or unless we are cut off from areas of the world now open to our ships.

Main reliance continues to be placed on imports. Manganese ore is coming in right along from Brazil, Cuba, Africa and India. This being a global war, our ships continually travel to many ports. Inasmuch as they have to come back loaded or in ballast it is a simple matter to find bottoms to bring in cargoes of manganese ore.

The question as to insurance of an adequate supply of manganese ore under any circumstances was taken up by the Council of National Defense as early as 1940. Since then it has received attention by many experienced men. For many months, as will be recalled, the shipping situation did not look nearly as promising as it does now. There were periods when the loss of India was threatened. There was a long period during which ship losses by submarine attacks were on the increase. There were uncertainties about the scope of our operations in the Pacific.

Nation Prepared for the Worst

In studying the overall manganese problem, therefore, it became necessary to prepare for the worst, and to prepare to depend on our own reserves of low-grade manganiferous ores on a large scale even though this would mean much higher costs in converting these ores into usable material.

In informed circles it is believed that if it became absolutely necessary to do so, we could supply as much as 40 per cent of our current manganese requirement out of low-grade domestic material by using metallurgical processing methods which have been worked out. In fact, it is believed that by further laboratory work additional methods might be worked out to permit use of even more of our low-grade material—sufficient, in fact, to supply all of our manganese needs over a period of a number of years.

Most important workable deposits in this country are five in number and are located in or near Butte, Mont., Las Vegas, Nev., the Cuyuna range in Minnesota, Aroostook county, Me., and Artillery Peak, Ariz. In each case the beneficiation and metallurgical processing operations are costly, but they have been worked out on a practical basis.

Because of the favorable overall situation, and because full exploitation would divert steel and other critical materials from the war program, also because of the manpower shortage, not all of these properties are being developed at this time and there is little likelihood that the present domestic manganese producing industry will be expanded further.

Of the five districts mentioned above, only one is shipping beneficiated manganese concentrates at this time. This is Butte, where a plant owned and operated by the Anaconda Copper Mining Co. is delivering to the government at a guaranteed price.

Late in 1941, after the ore in the Las Vegas area had been studied, construction of a concentrating plant there was authorized. This project has gone forward and this plant is expected to go into operation this month. It is a government-owned plant and is to be operated by the Manganese Ore Co., subsidiary of the M. A. Hanna Co., Cleveland.

Early in 1942, after a metallurgical process had been worked out for the manganiferous ore in the Cuyuna range, construction of a plant in that district was authorized. Shortly after, however, this project was "frozen," on the ground that the need for manganese was not sufficiently pressing to warrant diversion of critical materials and manpower to this project.

No Maine Operations Yet

Exploratory work in the summer of 1942 revealed that the Maine deposit approaches in size the "black ore" deposits of the Cuyuna range. It also is quite similar in grade, although the metallurgical processing operation is somewhat different. Mining and concentrating operations could be inaugurated in the Maine area at any time the War Production Board deemed such action necessary, which, as indicated above, is not at all likely.

The Artillery Peak deposits are considered to be least promising among those of the five largest areas and the costs there would be even higher than costs in the other areas. Present thinking is that the Artillery Peak deposit should be held in reserve to supply crude concentrates to the Las Vegas mill should that be considered necessary when the Las Vegas deposits become exhausted.

From Butte, Las Vegas, Cuyuna and Maine it appears possible to produce some 400,000 gross tons of 60 per cent manganese concentrates annually over a period of five to ten years. After that the rate of production would start to decline.

Actually total domestic production is expected not to exceed 300,000 gross tons annually.

There are several other districts where concentrating plants may or may not be practicable. Government-owned plants have been proposed at one time or another for location near Batesville, Ark., Shady Valley, Tenn., Deming, N. Mex., Delta, Utah, Battle Mountain, Nev.,

OUTSTANDING JOB

Since 1940 an increasing number of geologists, mining engineers, metallurgists and others, associated with the War Production Board, the War Metallurgy Committee of the National Academy of Sciences, National Research Council, the United States Bureau of Mines, the United States Geological Survey, the Office of Scientific Research and Development, the Board of Economic Warfare, the Department of State, the Reconstruction Finance Corp. and other bodies, have done an outstanding job in making strategic minerals available in required quantities to support production of carbon and alloy steels.

Despite the fact we are hampered importing from some areas, large quantities of the strategic minerals continue to be received from abroad — and in not a single instance has a ship been sent out in ballast to bring in such cargo.

In addition, intensive exploratory work has uncovered huge domestic deposits of manganese ore, chromite, tungsten ore and other ores, while laboratory work has resulted in development of processes for using these ores.

Phillipsburg and Butte, Mont. Construction of a government-owned mill at Butte will be under way shortly. It will be operated by the Domestic Manganese & Development Co. At Battle Mountain private operators are operating their own mills. In the other areas the government has bought and continues to buy low-grade material but the construction of more concentrating mills is considered unlikely.

South Dakota Has Largest Deposit

There is still another deposit of low-grade material—the largest of them all. This is in the locality of Chamberlain, S. D., where there is a vast amount of shale containing about 1 per cent manganese. A successful mining and preliminary concentrating procedure has been developed to produce nodules containing 16 per cent manganese. The next step—that of converting these nodules into usable product—has not been worked out. It is felt that the principles that would have to be followed are well understood. Again in this instance, because of the critical situation in materials and manpower, it cannot be assumed that any further effort is to be expended at this time aimed at converting Chamberlain shale into a suitable manganese concentrate.

To further ease the manganese situation and provide insurance against developments that might cut our sea lanes, the government continues to buy and stockpile manganese ore in Cuba, Brazil and Chile.

As stated above, the government is paying a very high price for domestic manganese concentrates. It is paying $1.00 a unit for 48 per cent concentrates, with premiums and penalties for manganese content above or below 48 per cent. This is the price paid for concentrates delivered at the nearest rail point or delivered at government buying stations. On top of this price the government pays freight rates and sampling and handling charges that come to 25 to 30 cents a unit. In turn, the government sells the concentrates at the 90 cent ceiling price. It thus absorbs a loss of 35 to 40 cents a unit, or about $17 to $19 per gross ton. In normal times the market on high grades of imported manganese ore usually is somewhere within the range of 35 to 45 cents a unit, duty paid, Eastern seaboard.

In chrome ore the situation is quite similar to that in manganese ore. In spite of the fact that 1943 consumption of chrome ore is about 80 per cent above 1940 consumption, with a further expansion to around 100 per cent scheduled for 1944, we actually are increasing our stocks of chrome ore.

This happy situation is due largely to the fact that the Allied nations did not lose Madagascar and New Caledonia.

Cuba now is capable of supplying sufficient chrome ore to take care of all our refractory requirements, and the known reserves in Cuba now are considerably larger than even two years ago.

Promote Use of Low-Grade Chromite

As was the case with manganese, every effort was made to make it possible to use low-grade domestic chromite in large quantities and three large government-owned operations were established, two in Montana and one in Oregon. In addition the government buys from small-lot producers.

For chrome ore of standard metallurgical quality, containing 48 per cent chromium oxide and having a 3 to 1 chromium-iron ratio, the government pays $52.80 per gross ton, delivered at the nearest railroad point or at small-lot purchasing stations. On top of this the government pays an average freight of around $13 and incurs other expenses coming to around $2. After selling this material at the ceiling price the government's loss comes to $23 to $24 a ton.

It is believed that we could produce well in excess of 500,000 gross tons of chrome concentrates annually for a period of several years from domestic sources—if that were necessary. Due to the present comfortable situation in bringing in high-grade chromite from abroad, nothing like this tonnage will be produced from domestic sources. In fact, domestic production is tending to decrease because of the greater need for miners in copper and other mines.

Presents Postwar Headache

One of the headaches that lies ahead is what to do about these wartime mining operations when the emergency is past. The Scrugham bill, under which the government would continue to buy the product of marginal and submarginal mines at the highest wartime prices and stockpile it, is but one indication of the pressure that is going to be brought to bear. Recent hearings on the Scrugham bill revealed that this measure has powerful support and will be a campaign issue in a number of the interested states.

After all, a subsidy of $18 a gross ton on 300,000 tons of manganese ore comes to $5,400,000, and when you add the other ores that the government is buying from domestic producers at a loss it all adds up to a total that is not to be sneezed at.

AMPHIBIOUS TRUCK:—In this radio photograph from Sicily, Gen. Sir Bernard L. Montgomery, leader of the British eighth army, is shown touring captured Sicilian cities in this 2½ ton truck, familiarly known as the "Duck." Although in volume production at General Motors Truck & Coach for some time and having seen action in the South Pacific, this is the "Duck's" first appearance in the European theater of war. Combining the qualities of a 31-foot all-steel landing boat and a sturdy, 6-wheel drive truck, it is particularly useful in amphibious operations. Acme photo

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

INSTRUCTIONS

STEEL PRODUCERS: Production directives for tin mill products give the maximum tonnage of primes and seconds to be produced. They do not cover production of waste waste or black plate rejects. A producer must not accept orders for waste waste and black plate rejects in excess of tonnage of such material which will result, in the ordinary course, from his production of primes and seconds in accordance with his production directive.

Production directives for other steel products cover total production, including both primes and less than prime quality material. Therefore, a manufacturer's total acceptance of orders for both types of material must not exceed 110 per cent of his production directive adjusted for carry overs from an earlier month. It follows that, in accepting orders for prime quality material, a producer must make allowance for his normal production of second quality material.

ALUMINUM PRODUCERS: Each producer of aluminum controlled material (except companies producing only in the form of castings and the rivet departments of aircraft companies) must report any stoppages or slowdown of production and its cause. This report must be made by telegram to the chief of the Fabrication Branch, Alumnium and Magnesium Division, War Production Board.

Aluminum rivet producers operating under subcontractual arrangements must report to their contractors in the same manner as other producers of aluminum fabricated products are required to report to WPB.

Under a provision of CMP regulation No. 1 controlled materials producers are to fill orders which are not authorized controlled material orders if delivery is "made pursuant to a specific direction of the WPB." This refers only to directions issued under the CMP formerly issued by the director of the Aluminum and Magnesium Division, but since March 24 issued by the WPB over the signature of its recording secretary. It does not refer to authorizations on form PD-26A or authorizations issued by the Aircraft Scheduling Unit.

ALUMINUM CONSUMERS: All consumers of aluminum for alloying and deoxidizing purposes, thermit reaction and chemical uses must file WPB-2360 (formerly CMP-13) with the Aluminum and Magnesium Division by Aug. 20 for requirements of aluminum for the fourth quarter for items enumerated in section I of the report form.

SECONDARY ALUMINUM: In conjunction with the recent price revision by OPA of secondary aluminum ingot, and in order to insure a readier flow of scrap into consuming channels, the Aluminum and Magnesium Division again will entertain applications for allotment of secondary grades of aluminum for fourth quarter requirements by producers of aluminum bronze, manganese bronze, magnesium-base and zinc-base alloys. This will afford consumers an opportunity to take advantage of the price reduction, while at the same time relieving pressure of order loads on primary producers.

Users of intermediate aluminum hardeners are reminded that if the aluminum content of the material requested is 85 per cent or more, the gross weight should be reported; if less than 85 per cent, net aluminum content should be reported in section III, column (c), and full alloy specifications in column (e).

CMP REGULATIONS

WELDING ROD: Preference rating of AA-2 has been assigned to repair shops for the acquisition of welding rod. It may be used regardless of whether or not the shop carries welding rod as an operating supply. Repair shops may use the rating to buy only as much welding rod per month as it used during the previous month, up to $100. However, any shop may purchase up to $15 worth of welding rod regardless of the amount used in the previous month. Additional rod may be purchased by: (1) Use of a customer's rating for a specific job; (2) by applying for a rating for a specific amount of welding rod on PD-1A; (3) if the shop also needs controlled material, by filing CMP-4B and using the rating assigned for all the welding rod it needs. (CMP No. 5)

CONSTRUCTION: In cases where specific WPB authorization is not required under order L-41 to begin construction, CMP regulation No. 5 procedures may be used to obtain required materials and products up to $500 in cost. (CMP No. 5)

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Subject	Designations
Abrasives	M-319
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Magnesium	No. 314
Pig Iron, Silvery	No. 405
Transit Controls	No. 136
Wire and Cable	No. 82

L ORDERS

FURNACES: Control of furnace production has been placed directly under the Controlled Materials Plan, enabling WPB to meet the fluctuating demand so prevalent with respect to this product. Materials will be allocated for the production of furnaces at a rate based upon actual requirements of the Army, Navy, Maritime Commission, War Shipping Administration, war housing and essential civilian needs. Furnaces may be delivered only on orders rated A-10 or higher. Further simplification of furnaces produced and a limitation on number of models which can be made also have been established. The order, L-22, now covers production and distribution of cast iron and steel furnaces, the latter having been previously controlled by order L-22-a, which is revoked. (L-22, L-22-a)

COOKING APPLIANCES AND HEATING STOVES: Quota restrictions have been imposed upon individual producers of domestic cooking appliances and domestic heating stoves have been removed but the quantity of the different types of stoves that may be produced by the industry as a whole is now definitely specified. This quantity is only to the extent necessary to meet approved programs. Return to production of the larger firms is provided as it is determined that their production is needed. A simplification program also is provided which specifies the number or models and types of which will be permitted. (L-23-c)

CASKETS AND VAULTS: Prohibition on the use of any iron and steel for reinforcing purposes in concrete burial vaults after June 30, 1943, has been removed. Manufacturers are limited, however, as to the kinds and amounts of steel they can use. Caskets which have been made from parts fabricated prior to May 1, 1943, and which exceed dimensions specified in order L-64 can be sold now without a certification of need. (L-64)

HEATING EQUIPMENT: Distribution of extended surface heating equipment now is restricted to orders which specify a delivery date, are rated AA-3 or better, or which are for repair parts. Schedule I of the order provides an extensive simplification program for the industry, reducing the number of sizes and types which may be made. (L-107)

STEAM TURBINES: No person now is permitted to install on any steam turbine for land use, with certain exceptions, sheet metal lagging, asbestos or other high temperature molded insulation, ornamental trim, gage equipment larger than specified sizes or larger than the minimum practicable size, duplicate instruments, more than a single oil pump or tubing or other special materials not customarily furnished by the manufacturer for the conditions under which the turbine is to operate. (L-154)

WATER HEATERS: Production of water heaters for essential civilian uses, including necessary replacements, may be resumed on the basis of a specified percentage of similar equipment produced in 1941. Sales are restricted to orders rated A-10 or higher. (L-185)

M ORDERS

SILVER: Foreign silver now is permitted only in manufacture of medicines and health supplies, photographic industry, manufacture of electrical contacts and other products or parts used for electrical current-carrying purposes, manufacture of miscellaneous "other products" and on orders carrying a preference rating of AA-5 or higher, with some exceptions. Foreign silver may no longer be used for certain restricted uses defined in the amendment, regardless of preference ratings.

Use of treasury silver is permitted only in the manufacture of engine bearings, official military insignia, brazing alloys, and solders.

Domestically mined silver is channeled to nonessential industry for restricted uses upon the basis of 50 per cent of 1941 or 1942 consumption, whichever is larger. These uses include those for manufacture of silverware, jewelry, badges and insignia (other than official military), church goods, clothing and container closures, pens and pencils, toilet articles, picture frames, musical instruments, electroplating not necessary for operational purposes (except for use in manufacture and repair of surgical instruments, appliances and equipment.)

Scrap generated by manufacturers in processing of treasury silver becomes "foreign silver" at the 45-cent price if it does not remain in the ownership of the manufacturer who produced it. Manufacturers are prohibited from purchasing or accepting delivery of silver of any kind if they have more than a 30-day accumulation of scrap silver, with certain qualifications. No manufacturer may have scrap melted, reformed, or redelivered, under toll agreement, if this redelivery should raise his inventory in excess of a minimum practicable working inventory.

Requirement for a delivery certificate is discontinued but a use certificate is required. (M-199)

ABRASIVES: Applications for authorization to use or accept delivery of manufactured crude abrasive during September-October must be made to WPB on form WPB-2779 (formerly PD-888) by Aug. 10 and by tenth of the month preceding each subsequent two-month period. Applications for authorization by a producer or importer who desires to use, or any person who desires to accept delivery of abrasive grain must be filed on WPB-2781 (formerly PD-886) by the first day of each month preceding each subsequent two-month period. By Aug. 10 and bi-monthly thereafter by the tenth of each alternate succeeding month, each producer or importer must

file with WPB his proposed schedule of production and importation of manufactured crude abrasive and/or abrasive grain for the next succeeding two months. Proposed schedules for manufactured crude abrasive must be filed on WPB-2782 and for abrasive grain on WPB-2780. Schedule A, annexed to the order, is amended to permit use of aluminum oxide grain coarser than grit size 80 for roughing operations on optical lenses and other precision optics. (M-319)

PRICE REGULATIONS

WIRE AND CABLE: Provisions for the individual adjustment of ceiling prices for producers and sellers of wire, cable and cable accessories have been made by OPA. The tests of essentiality are specifically spelled out in the amendment as are various cost, price, and competitive data factors which OPA will consider in reviewing the applications for adjustment. (No. 82)

TRANSIT CONTROLS: All sales of trucks, busses and trailers manufactured after Aug. 12 at any level are now controlled by price regulation No. 136. Prices may be calculated under a formula method resulting generally in prices reflecting March 31, 1942, levels. All units designed for use as military vehicles are excluded. Cars and trucks classified as material handling equipment remain covered by appendix A of the regulation which provides formula prices generally reflecting October, 1941 levels. It prohibits payment of any fee by the buyer, which if added to the purchase price of the machinery results in an amount exceeding the applicable maximum price. (No. 136)

FERROMANGANESE: Maximum prices at which independent warehousemen may sell manganese alloys and metal are established at the producers' maximum price to the warehouseman plus 10 per cent for quantities of 500 pounds or over, 15 per cent for amounts of 100 to 500 pounds, and 20 per cent for amounts less than 100 pounds. Maximum silicon content permitted in standard grade high-carbon ferromanganese is raised from 1.25 per cent to 1.50 per cent. Quantity premium on sales of less than 2000 pounds of electrolytic grade manganese metal is raised from 0.4 cent to 4 cents a pound, correcting a typographical error that appeared in the original regulation. Premiums for delivery of this metal to the western zone also are raised to 3.35 cents a pound from 0.55 cent in carload lots; to 4.75 cents from 3.05 cents in less-than-carload lots, correcting allowances for freight costs. (No. 138)

MAGNESIUM: Sellers of magnesium or magnesium alloy ingot in special non-standard shapes which cannot be produced at the premium of 1 cent a pound permitted for non-standard shapes are authorized to submit proposed prices for such shapes to OPA for approval. The producer may sell the non-standard shape at the proposed price pending approval by OPA. If not disapproved within 15 days by OPA, the seller may consider the price approved. (No. 314)

FERROUS FORGINGS: Ferrous forging producers may obtain an adjustment of his maximum ceiling prices by qualifying under specified tests based on the essentiality of his production and its service in the war program. To apply for an adjustment, an essential producer must complete form OPA 694,411. If the producer turn out $500,000 or more of ferrous forgings per year, the apolication must be filed with the Washington OPA office; if under $500,000, it must be filed with his regional OPA office. (No. 351)

SILVERY PIG IRON: Ceiling prices of 15 per cent electric furnace ferrosilicon, popularly known as silvery pig iron, are established as follows: (1) Price differentials for silicon content are set up on a range of ½ of 1 per cent; (2) premium for each additional ½ of 1 per cent of silicon content now is permitted for any part of the increment in the premium bracket; (3) penalty for a phosphorous content of 0.70 per cent or more is abolished; (4) premium of 50 cents for each ½ of 1 per cent or fractional part of manganese in excess of 1 per cent is established. (No. 405)

Aircraft Industry Directed To Conserve Corrosion-Resisting Steel

USE of corrosion-resisting steel by the aircraft industry has been restricted by a directive issued by the operating committee on aircraft materials conservation. This directive has been approved by joint action of the Army Air Forces, Navy Bureau of Aeronautics, Aircraft Resources Control Office, and Aircraft Production Board of the War Production Board.

The aircraft industry now uses approximately 50 per cent of all the corrosion-resisting steel melted, the directive pointed out. Inasmuch as the aircraft program is increasing steadily and the supply of the alloying elements necessary for corrosion-resisting steel is not increasing at the same rate, it is necessary for the industry to conserve this material, particularly when relatively high in critical elements, wherever practicable.

It is believed that through the practice of using no richer alloy than is required for a given application sufficient corrosion-resisting steel can be provided. Of the several limiting factors on availability of this type of steel, two are currently most critical. These are:

"(a) The shortage of columbium and the impracticability of complete conversion to titanium. These are necessary constituents of material conforming to AN-QQ-S-757 (steel; corrosion-and-heat-resisting—18Cr-8Ni—plate, strip and sheet.)

"(b) The shortage of molybdenum, a necessary constituent of material conforming to AN-QQ-S-771 (steel; corrosion-resisting—18Cr-8Ni—bars and rods; grade MCR) AN-QQ-S-772 (steel; corrosion-resisting — 18Cr-8Ni — sheet and strip; grade MCR) AN-QQ-W-423 (wire; steel, corrosion-resisting.)"

Corrosion-resisting steel, conforming to the specifications listed in the above paragraphs or having compositions similar to those listed in the current issues of the Army and Navy Aeronautical Specifications may be used only in the following applications in airframes and airplane engines, unless otherwise specifically approved or requested by the procuring agency (Army Air Forces-Materiel Command, Wright Field, Dayton, O.; Navy Bureau of Aeronautics, Washington.)

"(a) All parts of the exhaust system which come into contact with exhaust gases and which are exposed to high temperatures.

"(b) Supercharger systems.

"(c) Vital engine or engine accessory parts exposed to temperatures in excess of 800 degrees Fahr. during fabrication or service, which during service are subject to severely corrosive conditions or to conditions likely to result in fatigue failures. Requests for material for such applications shall be marked 'High Temperature Stressed Parts.'

"(d) Hinges and hinge pins.

"(e) Welding rod and electrodes used in welding the above material."

The directive may be considered by all contractors as necessary authority for action as directed therein, for products under current and future contracts without waiting receipt of revised drawings, specification or change orders. This directive does not prevent utilization of stocks already on hand which have been processed to the stage at which they are no longer suitable for other acceptable and more desirable applications.

WPB Issues Instructions On Filing New Report Forms

Chemicals Division, War Production Board, has issued a revised version of PD-600, now designated as WPB-2945.

Several hundred WPB-547 forms (formerly PD-1X) are being returned each week because of failure to fill out the blanks properly. The blanks, used by distributors in obtaining priority assistance for replenishment of inventories, should be filled out carefully and all information which is called for should be provided, officials of the Wholesale and Retail Trade Division said last week. Otherwise, no action can be taken on the application and there will be no alternative but to return them to the applicants.

The previous PD-1X form became obsolete on Aug. 1 and cannot be used. Any request for priority assistance received on this form postmarked after Aug. 1 will be rejected and returned to the applicant.

Output of Heat-Treated Aluminum Castings Soars

Wartime demands have resulted in the doubling of production of high-strength heat-treated aluminum castings during the past 18 months, the War Production Board says. At the same time output of non-heat-treated sand castings has remained at the same level.

Since the start of the war use of dense castings made on high-pressure cold chamber machines for aircraft and ordnance uses has grown to the point where these constitute over 80 per cent of total shipments.

MEN of INDUSTRY

R. E. KENNEDY

CHARLES L. BEARD

C. L. HUSTON Jr.

FRED E. HARRELL

R. E. Kennedy has been elected secretary of the American Foundrymen's Association, Chicago, with which office the office of executive vice president has been combined. Mr. Kennedy thus becomes the administrative head of the American Foundrymen's Association, filling the vacancy created by the resignation of **C. E. Westover** as executive vice president earlier this year.

At the same time **C. E. Hoyt** was elected treasurer, **N. F. Hindle,** assistant secretary, **William W. Maloney,** staff assistant, and **J. Reininga,** assistant treasurer.

Mr. Kennedy was born in Vincennes, Ind., and graduated from Winona Technical Institute, Winona, Ind., and from the University of Illinois, Urbana, Ill. Following graduation he was an instructor in foundry practice at the University of Illinois from 1910 to 1917. During World War I Mr. Kennedy served in the United States Army Ordnance Department.

After the war he returned to the University of Illinois as assistant professor in charge of foundry work, and also served as assistant superintendent of foundry training, U. S. Training Service, U. S. Department of Labor. In 1921 Mr. Kennedy became assistant secretary of the American Foundrymen's Association; he was elected technical secretary in 1925, and secretary in 1938, to which post he has been re-elected with the additional duties formerly assigned to Mr. Westover.

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William M. Rand, vice president, Monsanto Chemical Co., St. Louis, and former general manager, Merrimac Division, Everett, Mass., has been elected to the executive committee of the company. **Daniel S. Dinsmoor** has been elected a vice president and will succeed Mr. Rand as general manager, Merrimac Division. **Julius A. Berninghaus,** general manager, Organic Chemicals Division, St. Louis, will retire, and be succeeded by **Osborne Bezanson,** a vice president, and now general manager, Texas Division. The Texas Division, with plants at Karnack and Texas City, Tex., will be consolidated with and become a part of the Organic Chemicals Division. All these changes are effective Nov. 1.

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Charles L. Beard has been elected vice president, Bell Aircraft Corp., Buffalo. Mr. Beard will continue as secretary of the corporation, but will resign as treasurer, being succeeded by **Louis Fenn Sperry. Leighton W. Rogers,** a former president, Aeronautical Chamber of Commerce, has joined Bell Aircraft as assistant to the president and special company representative.

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C. L. Huston, Jr., previously assistant to the president, Lukens Steel Co., Coatesville, Pa., has been named president of Lukenweld, Inc., a subsidiary of Lukens Steel also located in Coatesville. Mr. Huston, a member of the Association of Iron and Steel Engineers, succeeds **Everett Chapman,** who resigned to establish his own business as consulting engineer.

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Ralph J. Cordiner, former president of Schick Inc., Stamford, Conn., was named assistant to the president of General Electric Co., Schenectady, N. Y.

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Henry Dreyfuss, New York industrial designer, has been appointed a consultant in the design of aircraft to Consolidated Vultee Aircraft Corp., San Diego, Calif.

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John J. Yezbak has been appointed manager of the News Bureau, Timken Roller Bearing Co., Canton, O., succeeding **S. L. Huffman,** resigned.

—o—

Malcolm Farmer, formerly vice president, Phoenix Iron Co., Phoenixville, Pa., has been elected vice president and general manager, Plastic Manufacturers Inc., Stamford, Conn.

—o—

Fred E. Harrell, assistant chief engineer, Reliance Electric & Engineering Co., Cleveland, since 1934, has been appointed chief engineer, reporting to A. M. MacCutcheon, engineering vice president.

—o—

Oscar N. Lindahl, vice president, finance, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed chairman of the Committee on Federal Taxation, Controllers Institute of America, succeeding the late F. G. Hamrick. Mr. Lindahl is a former president of the Institute.

—o—

Vollmar W. Fries, on leave to the War Production Board in Washington, has returned to White Motor Co., Cleveland, as vice president.

—o—

Earl K. Clark has been appointed manager, appliance engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., succeeding **W. J. Russell,** who resigned to become vice president of Landers, Frary & Clark, New Britain, Conn. **H. R. Cummins** was named assistant to Mr. Clark.

—o—

Charles F. Kettering, vice president, General Motors Corp., Detroit, has been named chairman of a new advisory committee on the development of the Technological Institute of Northwestern University, Evanston, Ill.

—o—

K. C. Gardner, formerly vice president and general manager, United Engineering & Foundry Co., Pittsburgh, has been elected executive vice president and general manager. **Geoffrey G. Beard** has been elected vice president in

charge of sales engineering, **John L. Young** has been named manager of industrial research, and **William Hagel** has been appointed manager of machinery sales.

—o—

Frank A. Rudolph has been named eastern regional manager, Aircraft Accessories Corp., with headquarters in New York.

—o—

Lieut. (j. g.) Herbert E. Cragin Jr., U.S.N.R., formerly foundry manager, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has reported for duty with the Bureau of Ships, Navy Department, Washington.

—o—

George W. Ellis and **Henry F. Mullaney** have been placed in charge of the recently opened Philadelphia branch, H. M. Harper Co.

—o—

James L. Hagen has been named district manager for the state of Michigan, Alloy Casting Co., Champaign, Ill., and **E. W. Bock** has been appointed representative for the states of Wisconsin and Minnesota. Mr. Hagen is located in Detroit and Mr. Bock in Milwaukee.

—o—

J. B. McOwen has been appointed field metallurgical engineer, General Alloys Co., Boston, for New York city, Long Island, northern New Jersey, and eastern New York. Other changes in the field personnel of General Alloys Co. are: **E. E. Whiteside** named representative in northern and northwestern Ohio, with headquarters in Cleveland; **Paul A. Ford,** Michigan representative, with headquarters in Detroit; **A. H. Valentine,** representative in southern Ohio, headquarters, Dayton; and **R. W. Luzius,** representative in the Pacific Coast area, with Beverly Hills, Calif., his headquarters.

—o—

Robert P. Willey has been appointed sales manager, Washington office, Bethlehem Steel Co., Bethlehem, Pa., succeeding the late Emeric R. Leonard.

—o—

Knute Peterson has been named assistant production manager, Bell & Howell Co., Chicago.

—o—

Harold D. Kelsey has been appointed assistant to the manager in charge of engineering, Ft. Wayne Works, General Electric Co., succeeding the late R. H. Chadwick.

—o—

Ralph C. Stuart has been appointed manager, Lamp Division, Westinghouse Electric & Mfg. Co., Bloomfield, N. J. Previously, Mr. Stuart had been manager of the West Plant, Canadian Westinghouse Co., Hamilton, Ont., from 1930 until 1941.

—o—

Herman C. Price has been appointed a vice president, Kalamazoo Stove & Furnace Co., Kalamazoo, Mich.

—o—

Palmer M. Craig, for the past two years chief engineer in charge of radar and radio communications equipment development, Philco Corp., Philadelphia, has been named chief engineer of the radio division.

—o—

Luther L. Sheppard, previously manager, Indianapolis office, International Business Machines Corp., has been appointed resident manager of the company's plant in San Jose, Calif. **Roger R. Williams** has become superintendent of the new plant.

ALBERT V. DOLAN

Who has been elected chief engineer, Ft. Pitt Bridge Works, Pittsburgh, as announced in STEEL, Aug. 2, p. 84.

MATTHEW R. ROSSE

Who has been appointed sales manager, export division, Wickwire Spencer Steel Co., New York, noted in STEEL, Aug. 2, p. 84.

Forrest Jernberg, former general sales manager, refrigerator department, Mills Novelty Co., Chicago, has been appointed manager of war contracts procurement.

—o—

E. B. Newill has been appointed general manager, Allison Division, General Motors Corp., Indianapolis, Ind., succeeding F. C. Kroeger, vice president, who has been granted a leave of absence due to illness. **C. R. Osborn** has been elected a vice president and will be in charge of the Electro-Motive Division, La Grange, Ill., and **A. W. Phelps,** has been made assistant to **E. F. Johnson,** General Motors vice president in Detroit.

—o—

A. J. Couture has joined the Stolper Steel Products Co., Milwaukee, as personnel manager. Previously, Mr. Couture had been employment manager at the George J. Meyer Mfg. Co., Cudahy, Wis.

—o—

C. Harold Louree has been appointed district manager, New Orleans sales office, Ingalls Iron Works Co. Inc., New Orleans.

—o—

John Hardman Logan, treasurer, Visible Index Corp., New York, has been elected vice president of the company. He will continue also as treasurer.

—o—

N. H. Schwenk has resigned as divisional vice president of Cramp Brass & Iron Foundries Division, Baldwin Locomotive Works, Philadelphia, after 39 years with the company.

—o—

Frank R. Pierce has been named head of the Detroit public relations office, General Motors Corp.

—o—

Roy A. Peterson has been appointed manager of purchases, United States Steel Supply Co., Chicago.

—o—

George D. Ramsay, formerly in charge of raw material supplies for Kaiser Co. Inc., Fontana, Calif., has been appointed director of technical laboratories and materials development.

—o—

William B. Corbett has been appointed plant engineer, Willys-Overland Motors Inc., Toledo, O. In 1928 Mr. Corbett laid out and built the Los Angeles assembly plant of Willys-Overland.

—o—

George Bluth, formerly a member of the inspection staff, U. S. Army, at Ft. Wayne, Detroit, with the Quarter-

master Corps has been named general chief inspector at Willys-Overland Motors Inc., Toledo, O.

—o—

G. A. MacGillivray has been appointed West Coast sales manager, Eutectic Welding Alloys Co., New York. Mr. MacGillivray, a graduate of the Massachusetts Institute of Technology, had been associated with the Franklin Process Co., Providence, R. I., for several years.

—o—

Julain E. Tobey has been reappointed chairman of the Technical Advisory Board, Bituminous Coal Research, Inc., Washington.

—o—

Elliott W. Beckett, formerly St. Louis sales manager, Continental Can Co., has been named vice president and general manager, Continental Can Co. of Canada, Ltd., with headquarters in Montreal. He succeeds **Walter M. Tomkins,** who has been transferred to Chicago to assist **Paul E. Pearson,** vice president in charge of equipment manufacture.

G. A. MacGILLIVRAY

W. S. Cowan has been named to the field service staff, Minneapolis region, Monmouth Products Co., Cleveland, and **Edwin H. Busch,** formerly manager, U. S. Gypsum Co., San Diego, Calif., has joined Monmouth as West Coast manager. Mr. Busch will be associated with Colyear Motor Sales Company's west coast organization, headquarters in Los Angeles. The territory covered by the company's representative **Lou M. Air,** who has been serving Pennsylvania, Virginia, and West Virginia, has been increased to include northwestern Pennsylvania and western New York.

—o—

Millar Brainard, director of Cleveland Automatic Machine Co., Cleveland, has been appointed president of the company's newly-acquired G & N division, mentioned on page 78 of this issue. **G. V. Patrick,** executive vice president of Cleveland Automatic Machine Co., will also be executive vice president of the new division, assisting Mr. Brainard. **George A. Collier,** sales manager for Cleveland Automatic, has been appointed general sales manager of the combined divisions, and **Ward Martin** is sales manager, G & N division. **James Hammond,** president of Cleveland Automatic, also has been named treasurer of the new division.

OBITUARIES . . .

Col. Leonard Sherman Horner, 68, former president, Niles-Bement-Pond Co., and more recently adviser to the American Hardware Manufacturers' Association, New York, died Aug. 1 in Wolfboro, N. H.

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Frederick Paul Wessolek, 56, general superintendent, Ohio Crankshaft Co., Cleveland, died there July 28.

—o—

Philip B. Heintz, 82, president and general manager, National Casket Co. Inc., Boston, died July 28 in Centerville, Mass.

—o—

Major William B. Robertson, 50, president, Robertson Aircraft Corp., died Aug. 1 in the crash of a glider at Lambert-St. Louis Field, St. Louis. **Harold A. Kreuger,** vice president and general manager of the Robertson company, was also killed.

—o—

Frank Longstaff, 75, a partner in the Longstaff & Meredith Automobile Radiator Co., Milwaukee, died recently.

—o—

Edgar F. Collins, 69, former consulting engineer, General Electric Co., Schenectady, N. Y., died recently at Brown Lake, N. Y.

—o—

Charles Mitzman, 49, owner and president, Ohio Smelting Co., Cleveland, died there July 28.

—o—

W. K. Cooper, vice president, sales, Aviation Corp., Williamsport, Pa., died July 29 in an airplane crash near Trammel, Ky. Also killed in the crash was **R. H. Anderson,** business manager, Vultee Aircraft Corp., Nashville, Tenn., and **Harold Caminez,** 45, chief engineer, Lycoming Engine division, Aviation Corp., Williamsport, Pa., also was killed in the accident. Mr. Caminez was widely known in aviation circles as an inventor and design engineer of aircraft engines.

—o—

Arthur S. Hecker, 63, general manager, Arthur W. Hecker Co., Cleveland, and formerly president of the Hecker-Moon Construction Co., Cleveland, died there July 27.

—o—

Charles Goodnow Rice, 76, retired president, United States Smelting, Refining & Mining Co., Boston, and a director of United Shoe Machinery Corp., Boston, died July 29, in Ipswich, Mass.

—o—

Gould Grant Rheuby, 74, retired vice president, director, and member of the finance committee, Hercules Powder Co., Wilmington, Del., died July 28 at Glen Mills, Pa.

—o—

L. Clinton Hamlink, 68, vice president for the past 32 years of Gas Machinery Co., Cleveland, died in that city Aug. 3.

—o—

Albert Kingsbury, 80, founder and president Kingsbury Machine Works, Philadelphia, died in Greenwich, Conn. July 28. Mr. Kingsbury invented the Kingsbury thrust bearing used in warship and steamship driving shafts, land and marine turbines.

—o—

E. P. Jeffery, vice president in charge of manufacturing, American Blower Corp., Detroit, died in that city recently.

—o—

Julian D. Sargent, 59, former sales engineer, Chain Belt Co., Milwaukee, died recently in Los Angeles, Calif.

—o—

Elton G. Grammes, 50, production manager, John Harsch Bronze & Foundry Co., Cleveland, died July 27 in that city.

—o—

Robert K. Morton, 67, president, H. B. A. Steel Co., New York, died there July 26.

—o—

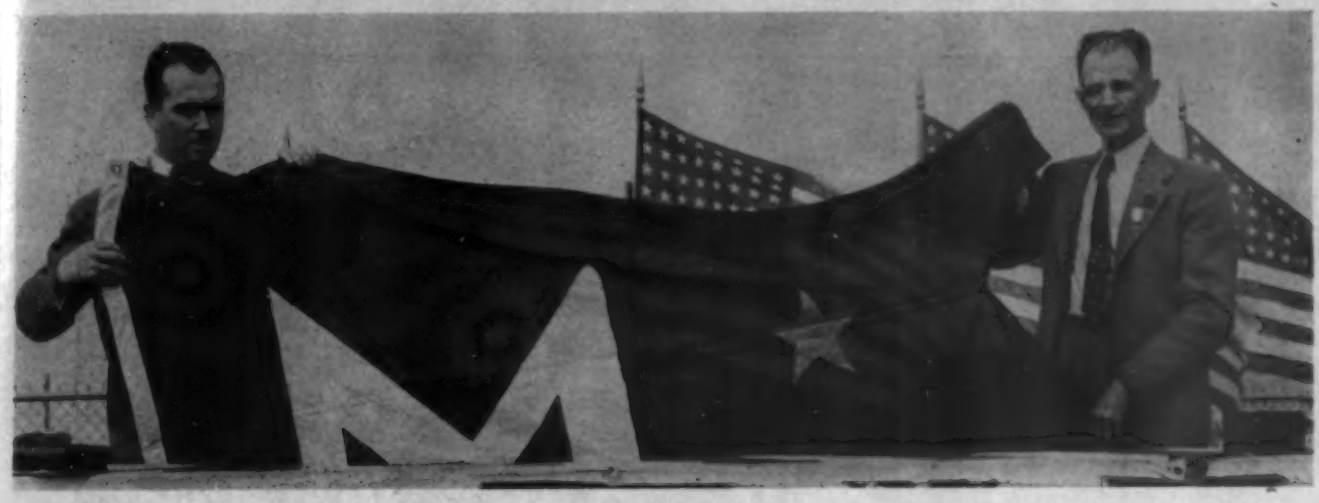
Wilson F. Clemens, associated with Great Lakes Steel Corp., engineering division, since 1929, died recently in Detroit.

—o—

Conrad Newton Lauer, 73, chairman, Philadelphia Gas Works Co., Philadelphia , died Aug. 2 in Pennlyn, Pa.

—o—

J. C. Agnew, 61, vice president, Winston Bros., Los Angeles, died there July 27. Mr. Agnew was formerly assistant to the president, Midvale Steel & Ordnance Co., Philadelphia. He also was associated with the Coatesville Plate Washer Co., Coatesville, Pa., and was a member of the American Iron and Steel Institute.



Above, E. A. Watkins, president, Watkins Inc., Wichita, Kans., is shown accepting the Maritime Commission's M award for the company and employes

To the right is shown Henry E. McWane, president, Lynchburg Foundry Co. (extreme right), at recent M award ceremonies at company's plant at Lynchburg, Va.

Below is shown Maj. Gen. Ralph Royce presenting the Army-Navy E banner to Ralph S. Damon, president, Republic Aviation Corp., Farmingdale, N. Y.

More Plants Are Honored With Army-Navy Pennants

Additional plants have been honored recently with the Army-Navy E award.

Allis-Chalmers Mfg. Co., La Porte Works, La Porte, Ind.

American Car & Foundry Co., Berwick Plant, Berwick, Pa.

American Cyanamid & Chemical Corp., Bauxite Mining & Processing Operations in Pulaski & Saline Counties, Little Rock, Ark.

Bell Machine Co., Oshkosh, Wis.

Camillus Cutlery Co., Camillus, N. Y.

Century Boat Co., Manistee, Mich.

Dewey & Almy Chemical Co., Cambridge Plant, Cambridge, Mass.

Fansteel Metallurgical Corp., North Chicago Plant, North Chicago, Ill.

General Machine & Mfg. Co., Berwick Plant, Berwick, Pa.

Indian Motorcycle Co., Springfield, Mass.

Link Belt Co., 39th Street Plant, Chicago.

Modine Mfg. Co., Racine Plant, Racine, Wis.

Simmons Co., Elizabeth Plant, Elizabeth, N. J.

Steel Products Co. Inc., Savannah, Ga.

Tantalum Defense Corp., North Chicago, Ill.

United States Spring & Bumper Co., Vernon, Calif.

The War...And You!

Friend—don't think this war doesn't affect you. It does. It's pushing the world twenty years ahead of time; stimulating the development of devices you may now be making or using. After the war, the average American's life is destined to be fuller, more exciting, more comfortable due to these new products. And just as Weatherhead has helped build the nation's automobiles, airplanes and refrigerators in the past, peace will find us prepared to join you in building these established products as well as the many new ones certain to come out of the war.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Second-quarter data of General Motors reflect sharp stepup in war materiel production by automotive industry during period. . . Corporation's output soars to new three-month high. . . June deliveries set monthly peak

DETROIT

INDICATION of the motor industry's stepup in production of war materiels through the second quarter of the year is given in figures just released by General Motors Corp. which show the corporation's production for April, May and June soaring to a new three-month high of $832,275,349, or 8.7 per cent ahead of the first quarter.

Increase in physical volume is even greater when account is taken of voluntary price reductions. Thus, June deliveries were under May in dollar volume but over in physical volume—in fact, breaking all of the monthly totals previously recorded.

During the second quarter, voluntary price reductions of approximately $80,000,000 were made on individual GM contracts, applicable to shipments which had already been made.

A comparison of wartime and peacetime industrial economies can be drawn from the fact that while total deliveries for the first six months of 1943 were 26.7 ahead of the dollar volume for the first six months of 1941—last year of peacetime operations—net income showed a decrease of 41.3 per cent.

GM Employment High

For the second quarter of 1943 there was an average of 426,554 employes on GM payrolls, 20,000 more than the average for the first quarter and far ahead of the 281,464 average for the same period a year ago. Average weekly earnings of hourly rated employes were $56.20, compared with $53.80 in the same period a year ago.

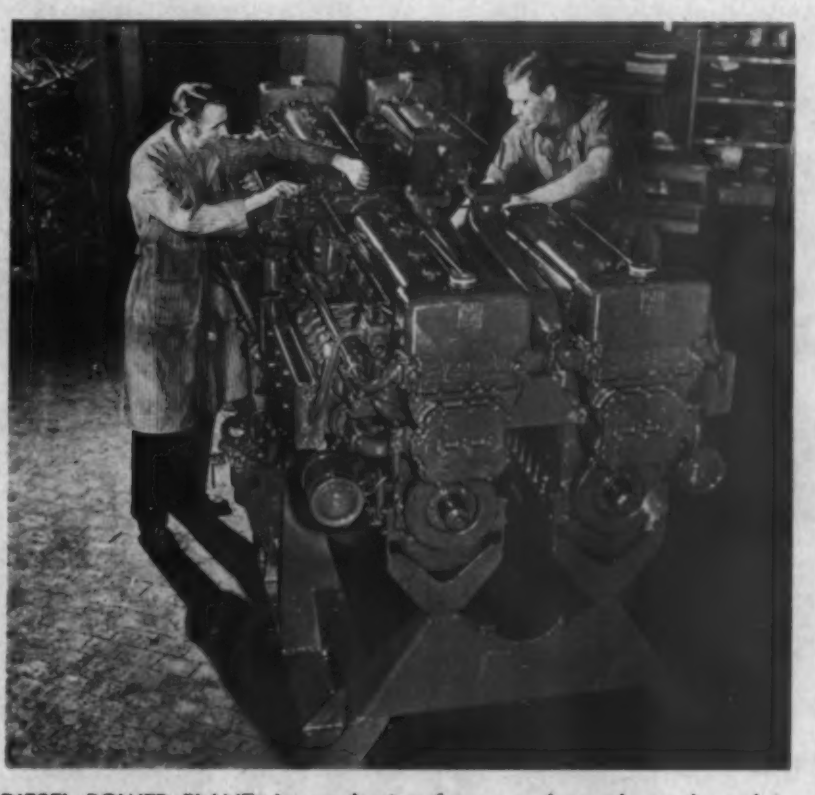
General Motors sliced $8,322,753 from second-quarter income for postwar contingencies and rehabilitation. This brought the total provision on this account for the year to nearly 16 million dollars, which together with amounts provided prior to this year makes a total of $56,562,971 available for postwar adjustments, or the equivalent of about a two weeks' payroll on the present basis. In addition the corporation has deducted $42,704,000 from six months' operations this year for retroactive price and other adjustments which may arise in connection with renegotiation of contracts.

Progressive easing off in the manufacture of combat tanks, of which the automotive industry has been a leading supplier (No. 10,000 rolled off the Chrysler tank line on July 20), may logically proceed much further. The tipoff came with the end of the North African campaign in which tanks were the star performers, not always in roles for which they were intended but at least in large numbers. Then the word came that the Russians had issued stop-orders for American tanks, and according to Lend-Lease figures they were getting something like one-fourth of U. S. production of medium tanks. Finally the war moved out of Africa and practically out of Sicily. New fields of operations likely will not call for near the numbers of tanks that the Army at one time envisioned. Furthermore the pipelines to the battlefronts are just about filled, so requirements will slow down to merely the demands of attrition.

There is another angle. It can be developed by looking back over the design progress of both medium and light combat tanks. First, the M-3 medium with its side-mounted 75-millimeter gun and limited field. This gave way to the M-4 on which the heavy gun was placed at the top with full-circle sweep. Then came the first of the so-called tank destroyers or self-propelled gun mounts—the M-7 and then the M-10—both of them design modifications of the basic medium tank aimed at stepping up firepower and mobility, while reducing armor protection. At one time not so long ago, a motor company supplier was building four M-10 tank destroyers for every one M-4 tank.

Design Changes Are Numerous

The tank destroyer command in Texas steadily grew in importance and in diversity of new vehicles, both wheeled and tracklaying and combinations or half-tracks. Sizes of guns mounted on these mobile units kept going up. High-velocity barrels replaced the old "cannon" barrels. Speeds and mobility kept climbing and still are. A basic change appeared in process in the army's attack philosophy in favor of the "hit and run" and "sneak punch" tactics as opposed to the lumbering break-through with massed heavy armor. It was mindful of the old arguments in football on the



DIESEL POWER PLANT: In production for several months and used in various types of Navy landing barges, this diesel power plant is known as the Quad. The four 6-cylinder two-cycle diesels are geared to a common propeller shaft at the center of the tandem unit. All four engines are attached to a centrally located gearbox

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relative merits of the "end run and forward pass" against the "off-tackle smash and line buck."

All this process of evolution in the armored force has a very real significance to suppliers of materials and parts in the field. The end is not yet in sight and probably will not be until the last day of battle. Right now, however, it looks like a sure thing that the armored car and high-speed tank destroyer, both half-track and full track, are consigning the old conception of the combat tank to the substitute bench.

Abnormal Wear on Bogie Wheels

One of the principal difficulties reported from the field in connection with tanks is the inordinate wear on tracks, bogies and sprockets. Bogie wheels in American tanks have always been comparatively small in diameter, around 12 inches, which would seem to be productive of heavy wear, particularly as speeds increased. Photographs of captured German track-laying vehicles seemed to suggest that their engineers had gotten around this trouble by making large-diameter bogie wheels, possibly 28 or 30 inches, some of them even overlapping in the train on each side. It will be interesting to see if this design principle is adopted on future versions of U. S. tank destroyers and self-propelled gun mounts.

Behind the design and development of these various old and new type vehicles is the well-knit organization of the Tank-Automotive Center of the Ordnance Department here in Detroit. Over the past year this group, rather hastily thrown together around a nucleus from Washington, has been gradually simmering down to something resembling efficient operations. Originally the Center occupied most of the Union Guardian building downtown and several floors of the Fisher building three miles out from downtown. Now, by process of weeding out excess and inefficient personnel and consolidating certain offices it has been possible to look forward to concentrating the entire group in the downtown location. Hence the Fisher building offices will shortly be vacated. They have been occupied chiefly by the Development branch in charge of Lieut.-Col. J. M. Colby, and the Engineering section of the Engineering and Manufacturing branch under Lt. Col. F. R. Young.

Packard has confirmed its occupation of the $5,000,000 Toledo, O., plant built originally for the Liquid Cooled Engine Division of Aviation Corp. New activity will include processing and machining of several hundred component parts of the Rolls-Royce aircraft engine. R. R. Rees, chief plant engineer for Packard, will head the Toledo operation, which is expected to reach full capacity by the end of the year. Employment, including practically all key positions, will be recruited locally, and annual payroll of this operation is estimated at $10,000,000.

K. R. Parker, former construction engineer in the Packard aircraft plant, will succeed Mr. Rees in the position of chief plant engineer.

Mass production X-ray machine capable of inspecting as many as 17,000 airplane castings in a 24-hour day has been developed by Westinghouse and is now being installed and tested in a Ternstedt Division plant in Detroit. Key to the new unit's speed is a moving conveyor 40 feet long and 3 feet wide which moves castings through the X-ray inspection area. An exposed film of six castings is made every 30 seconds. Designed to inspect both engine and fuselage castings up to 5 inches in thickness, the mechanism has two steel towers, each 12 feet high and located near the middle of the conveyor, each tower housing an X-ray tube—one of these tubes operating at 140,000 volts and the other at 220,000 volts.

Castings move along the conveyor on trays which stop automatically under the X-ray tubes. Lead-lined hoods protect workmen from X-radiations while the exposure is made. The unit can be operated by from one to eight men, depending on the speed of testing desired.

A comprehensive cross index of chemically equivalent specifications for ferrous and nonferrous metals, with an identification code, has been completed and published by General Motors under direction of C. L. McCuen, vice president in charge of engineering. The project was initiated about a year ago at the request of the armed services and has been developed in co-operation with various materials suppliers, national technical societies and a number of trade organizations.

Index Will Prove Helpful

The publication, a copy of which should be on the desk of anyone concerned with specification, purchase or use of iron and steel and nonferrous metals in war production, is divided into three parts. Part I presents exact chemical analysis of the various specifications, broken down into ten groups of code numbers: 0-999 for manufacturers' use in reporting analyses which are not covered by existing code numbers; 1000-9999, carbon and alloy steel (in most cases code numbers are identical with corresponding S.A.E.-A.I.S.I. specifications); 10000-12500, copper alloys; 13000-13500, nickel alloys; 14000-14500, lead or tin alloys; 14750-14850, silver alloys; 20000-20999, aluminum alloys; 21000-21500, magnesium alloys; 21700-21800, zinc alloys; 23500-23600, bismuth or cadmium alloys.

In addition to code numbers and chemical analyses, this section lists the material in its form, as well as the "source" specification number, sources being ten in number—army, army-navy aeronautical, air corps, NE steels, federal, A.I.S.I., Aeronautical Material Specifications (S.A.E.), navy, S.A.E., and A.S.T.M.

Part II lists the specifications of each of the various organizations named above, together with the code number identifying the group to which each specification number is indexed.

Part III is a numerical listing of the code numbers and their nominal compositions. The code numbers obviously are useful in making bills of materials reports, particularly for CMP reports.

Copies of the index may be obtained by addressing R. L. McWilliams, Room 8-133A, General Motors building, Detroit 2.

NEW METHODS PAY

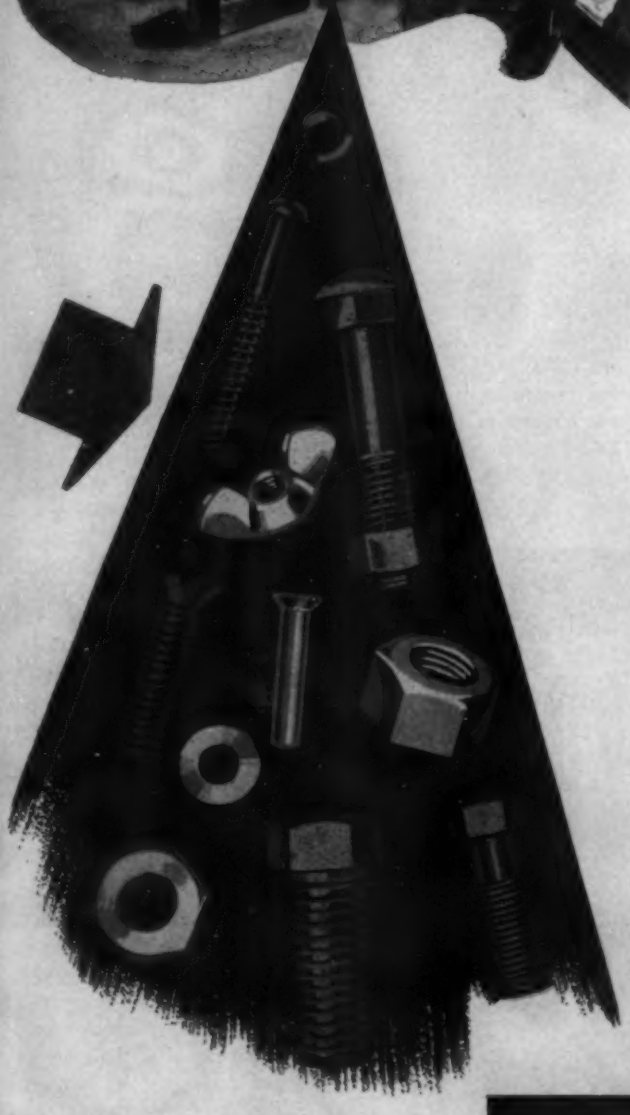
Substantial savings in material, manpower, facilities and money have been effected by the airplane industry through utilization of improved manufacturing processes. Use of solid bar stock, forgings and sand castings which require extensive machining, milling, boring, and profiling has been supplanted wherever possible by processes employing stamping, die casting, permanent mold castings, centrifugal castings, welded assemblies and powder metallurgy.

An aircraft engine component, for instance, previously machined from stainless steel solid bar and tubing is now stamped from sheet with a material saving of 80 per cent and at a cost reduction of 45 per cent.

An aircraft hardware item formerly machined from critical stainless steel bar stock is now drawn and drilled from non-critical carbon steel strip. The old method required 285 pounds of steel for production of 1000 units while the new method requires only 62½ pounds. Scrap production has been reduced from 83½ to 24½ per cent.

2¢ WOULD HAVE PREVENTED THIS SHUT DOWN

. . . 2¢ MORE FOR A NON-RUSTING BOLT IN A VITAL PART



CAN A COUPLE OF PENNIES more per bolt save thousands of dollars? Indeed they can . . . and Harper Fastenings are proving it every day. Saving huge sums by preventing hidden destruction by rust and corrosion. They help war production machinery to stand up under today's grueling speed and overtime.

Such tremendous trifles, these Harper non-ferrous and stainless fastenings. Trifling too, in their extra cost. Yet tremendous in their usefulness.

4320 STOCK ITEMS . . . of bolts, nuts, screws, washers, rivets and accessories in the non-ferrous and stainless alloys.

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WING TIPS

Bright future foreseen for Douglas Aircraft Co. in postwar production of transport planes. . . Use color system to solve troublesome steel marking problem. . . Labor troubles notably absent in plants because of good employe relations setup

AMONG principal aircraft manufacturers, Douglas Aircraft Co. has an exceedingly good postwar opportunity to continue a fair share of its present plane-building activity because Douglas has occupied a prominent position in supplying commercial airliners like the well-known DC-2 and DC-3 ships flying many airlines today. The company's scout bombers, torpedo bombers and attack bombers may go into oblivion with the day of peace, but there is general agreement on a bright future for greatly expanded air transport.

Douglas began operations in southern California 23 years ago, although its founder, Donald W. Douglas, became interested in aviation as far back as 1909 when he saw the Wright brothers fly their first plane. A native of Brooklyn, N. Y., he resigned from the Naval Academy after being bitten by the aviation bug and studied aeronautical engineering at Massachusetts Institute of Technology. He later worked with Commander J. C. Hunsaker on development of the first wind tunnel and for a time was chief engineer for Glenn L. Martin.

First design of Douglas Aircraft was a 3-place biplane called the "Cloudster". In 1922 Douglas introduced the DT-1, first torpedo-carrying airplane; in 1925 the M-1, first mail plane, and the C-1, first cargo-carrying plane. In 1924, Douglas "World Cruisers" became the first planes to circumnavigate the globe with army pilots and crews. The DC series began in 1932 and by 1935 they were flying in 57 nations.

B-19 Still Largest Bomber

It was a long trail of progress from the first Cloudster to the giant 82-ton experimental bomber, the B-19, which Douglas finished a couple of years ago at a cost of something like $3,500,000. It is still the largest bomber ever built.

Douglas Aircraft now operates a network of plants in southern California and in the Southwest and Midwest. They include the home offices and plants in Santa Monica, El Segundo and Long Beach, Calif. In the Southwest, Douglas operates vast new plants at Oklahoma City and Tulsa, Okla., while in Chicago a new plant featuring practically all wood construction is manufacturing C-54 cargo planes. Latest project is a $10,000,000 modification center which the company operates at Daggett, Calif.

A word may be in order regarding current production models. Transport and cargo versions of the DC-3 are the C-47 Skytrain for cargo and C-53 Skytrooper for personnel, and, for the Navy, the R4D-1, 3, 4 and 5, depending on various structural details but the same basic ship. This is a two-engine ship, commonly called the "work horse" of the air lines", weighing about 9 tons empty and capable of carrying 3-5 tons load. It has a normal range of about 1500 miles and is built in California and Oklahoma.

Better than twice the size of this basic design is the military version of the DC-4, a four-engine ship being built in California and in Chicago, called the Skymaster, the C-54 for passenger transport and C-54A for cargo in the Army design, and the R5D for the Navy. It will carry 54 hospital litters, or a light tank, or a heavy truck, and has an interior hoist for loading purposes. Normal gross weight is 66,000 pounds, of which approximately 26,000 pounds are payload.

In the single-engine field, Douglas supplies the SBD Dauntless dive bomber for the Navy and the similar A-24 dive bomber for the Army. In the two-engine class are the A-20 Havoc attack bombers and the DB-7 Boston, U. S. Army and R.A.F. designations for the same craft.

Works With Other Builders

Douglas also co-operates in the Boeing Flying Fortress B-17-F west coast pool, building them at the Long Beach plant; likewise assembling B-24 Consolidated bombers at Tulsa from parts shipped from Ford's Willow Run. Another co-operative venture, just the reverse of the B-24 setup, is the production of Douglas A-20 attack bombers at the Nashville division of Consolidated Vultee. As a matter of record, Consolidated has established an office at the Douglas Santa Monica plant, with engineers on the scene to co-ordinate tooling and other activities.

By far the largest capacity of the company is concentrated in the two and four-engine fields. This points the way to the future of Douglas in the aircraft field.

Among numerous innovations in manufacturing practice at the Santa Monica plant is a gravity-feed assembly floor on which A-20 bombers are finally assembled. The concrete floor is sloped slightly (8 inches in 200 feet) so that carriages on which the planes are moved through the shop will travel of their own weight along a guide channel set in the floor, avoiding the need for power to move the partially completed planes through assembly stations.

The Douglas El Segundo plant near Inglewood is unusual in that employment is 65 to 70 per cent women, near the highest ratio of any airplane plant in the country. Since the planes being

Rope drop hammers with Kirksite dies used to form aluminum alloy shapes. Some plants are replacing this equipment with powered hammers known in the industry as Cecostamps

HIS "SCATTER GUN" EATS FROM A NEW FEED BOX!

When the sharpshooter in a bomber goes into action, his pet "scatter gun" literally *pours* .50 caliber shells. These are fed into the machine gun from cartridge belts carefully packed in special ammunition boxes.

Formerly these "feed boxes" were constructed of a scarcer metal. Now many are made of ARMCO ZINCGRIP — a zinc-coated steel with a tightly adherent coating. Because the zinc does not flake or peel when severely formed, it gives protection to the corners as well as the flat parts.

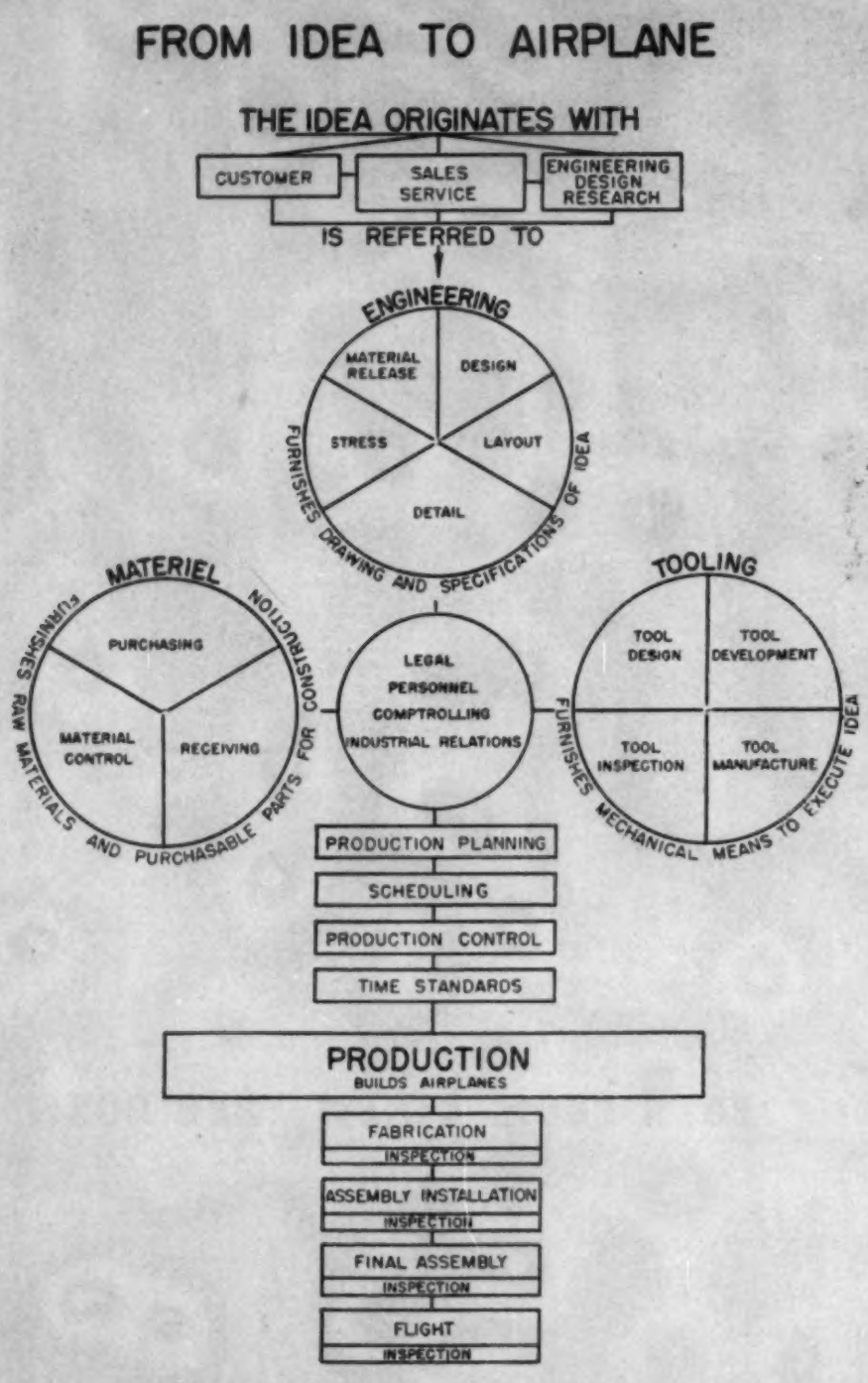
Shells must be safeguarded against contact with corroded surfaces to insure a smooth flow of deadly lead from machine guns. Rust caused by corrosive atmospheres would play hob with boxes made of ordinary metals.

This is only one of many fighting jobs for ARMCO ZINCGRIP and other ARMCO *special-purpose* sheet steels. When you need sheet steels for wartime tasks, or for the products you will make when peace comes, remember there is an ARMCO grade for every requirement.

For complete information on any of these grades, just address The American Rolling Mill Company, 1701 Curtis St., Middletown, Ohio.

MADE OF ARMCO ZINCGRIP

THE AMERICAN ROLLING MILL COMPANY



Organizational chart developed by Douglas Aircraft to show how an idea for a new plane progresses through various planning and production departments to final inspection

built there are the relatively small single-engine dive bombers, there is a minimum of heavy manual work involved. Women have proved eminently successful in all departments with the possible exception of the Kirksite foundry and drop hammer department.

Rope drop hammers are operated in a good many of the airframe plants on the west coast, where they adhere to the belief that a hefty smack provides the best forming pressure for certain aluminum shapes. One of the newer techniques at Douglas El Segundo is the use of both rubber pads and chunks of sponge rubber on top of the piece being formed particularly where the draw is deep. Rubber absorbs some of the impact of the falling male die and tends to prevent stretch wrinkles and tearing in the formed piece. The idea springs from the use of a rubber female die in the Guerin process for blanking and light forming work. Douglas developed the Guerin process and now has licensed many others to use it.

The Long Beach plant is among the newer Douglas plants. Both B-17 Flying Fortresses and C-47 cargo ships are built there, the plant comprising a series of adjoining but entirely separate units. This layout was developed to conform with suggestions made by the Army in respect to plant protection, the theory being that if one unit should be hit by an enemy bomb attack it would not incapacitate the entire plant because of the dispersion of the manufacturing, stores and assembly units. Over 22,000 tons of structurals went into the various buildings.

Use 35 Vertical-Lift Doors

Movement of large planes in and out of assembly buildings calls for special treatment of doors. There are in all 35 Firguson vertical-lift doors installed at Long Beach, each made in four horizontal sections with motors, reduction gears, counterweights and pushbutton controls combined to facilitate opening or closing the wide span in 80 seconds. A single door may be as much as 150 feet wide by 30 feet high. Framing is light structural steel between vertical I-beams, with sheet steel on the outside and a pressed insulation fiber on the inside. The door installations at Long Beach required 870 tons of steel, 107,350 square feet of insulation, 68 tons of steel castings, 832 hydraulic equalizers, 764 tons of counterweight balances, 63,500 feet of wire rope and motors totaling 163 horsepower.

Because of the great diversity of manufacturing operations and the large number of small parts processed, material control problems at Douglas are of considerable magnitude. Consider the single case of alloy steel used both in tooling and in production parts. About 150 types of tooling and production steels are in regular use and one of the most serious difficulties is in maintaining their proper identification both in storage and through processing. A color system for marking bars along their full length has been devised, but it has many deficiencies.

Purchase orders specify identification of steel at the source, but suppliers are so rushed these days that this detail is often overlooked. Douglas materials-control officials suggest that perhaps the aircraft industry should co-operate further in the simplification of the numbers and types of steel in use, and also in persuading mills to do a better job of marking.

Importance of steel marking is explained as the outgrowth of unending changes in specifications of thousands of parts going into airplanes—changes dictated by safety or design improvements, substitutions to relieve shortages, or by instructions from Wright Field. F. L. Dean, Douglas metallurgist, says it is

often worth more to know what a given material in process is than the intrinsic value of the steel itself.

An accompanying chart shows how material control, purchasing and receiving departments fit into the general flow chart of "idea to airplane" developed by Douglas. This arrangement does not apply to the Long Beach plant alone, but to all operations under the company's direction.

Douglas Aircraft is credited on the Coast with having done an exceptional job of industrial and public relations. Labor troubles have been notably absent, and union attempts to organize one or another of the Douglas plants have been unsuccessful, the most recent example being the defeat of both the UAW-CIO and AFL in an election at El Segundo. Much of this labor harmony doubtless springs from the quiet skill of A. M. Rochlen, industrial and public relations director, and his staff, who maintain close contact with employes and top management. Douglas was one of the first West Coast companies to adopt the 10-minute rest periods twice on each shift, and to organize lunch-time entertainment and athletic contests for its employes.

Latest management wrinkle at Douglas plants is the organization of a "high command" to provide a more compact and streamlined administration of the nation-wide network of operations. The committee is headed by President Donald W. Douglas, and includes Frederic W. Conant, vice president and director of manufacturing; A. E. Raymond, vice president, engineering; John M. Rogers, vice president, contract administration; Ralph V. Hunt, vice president and comptroller, and Mr. Rochlen.

Announcement of the committee's organization followed closely the revelation that Douglas in May broke all production records by turning out more than 13,000,000 pounds of warplanes, an increase of 150 per cent over May, 1942, and 698 per cent over May, 1941.

Cutting Tool Conservation Being Pushed by NIAA

National Industrial Advertisers Association has joined forces with the Division of Information of the War Production Board and the War Advertising Council, to promote the national campaign to cut down the alarming waste of industrial cutting tools.

More than 9,000,000 workers with little or no previous experience in the metalworking industries now are concerned in one way or another with operations involving broaches, milling cutters, drills, taps, reamers, and many other standard and special tools whose total annual output, running to $450,000,000, is in danger of being insufficient to keep up with current demands.

Analysis of the situation by WPB indicates three main causes of undue wastage:

(1) Breakage and spoilage of tools due to carelessness or lack of knowledge of tool handling and use;

(2) Dulling and other damage resulting from lack of care when the tool is not in use;

(3) Needless scrapping when tools can be repaired or new tools created by tipping, grinding, brazing and other methods of reclamation.

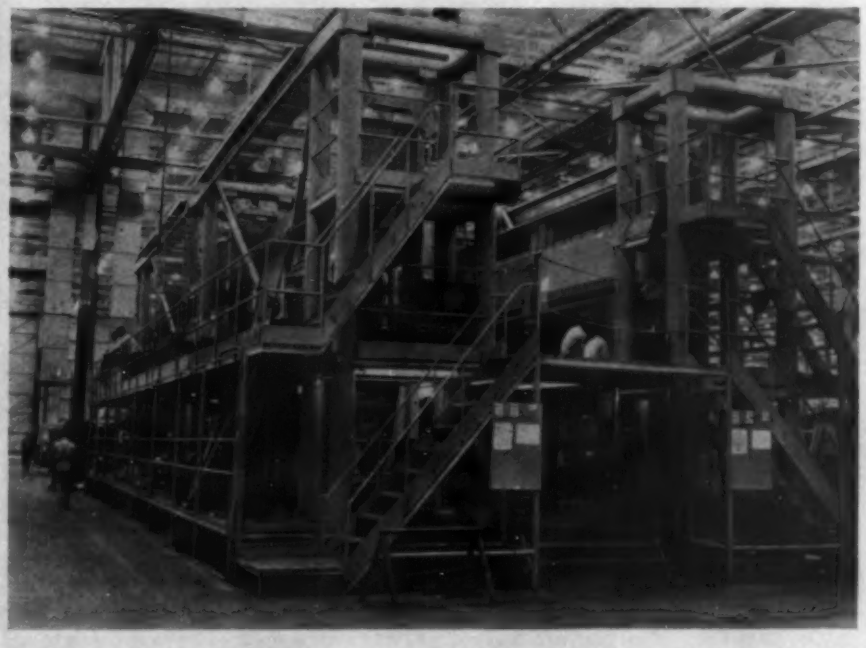
The government campaign centers in the Conservation Division, WPB, which is working closely with the Tools Division, War Training Activities and War Production Drive authorities.

Needless breakage, under wear and thoughtless scrapping of vital tools can only be halted by a nation-wide campaign which will reach right down into the plants where this spoilage is occurring. Featuring the slogan, "Tools Are Weapons—Treat 'em Righ!" industrial advertising will be used to drive home the crying need for, and practical ways and means of, tool conservation. At the same time, local chapters and members of NIAA will take direct action in industrial centers and in individual plants to see that conservation meetings are held, that posters are mounted in prominent positions and that workers are given intensified instruction in the proper handling of tools.

To further this important phase of the campaign a text book for industrial advertisers and trade publications has been prepared by the War Advertising Council and the War Production Board.

This book explains the objectives of the campaign and contains a wealth of material useful in developing advertising copy to key in with this vital phase of the war production program. Copies of this book are available from WPB Division of Information, Conservation Section, 11th and H Sts., Washington.

Particulars on this campaign can be obtained by writing to National Industrial Advertisers Association, Inc., 100 East Ohio street, Chicago. Wilmer H. Cordes is vice president in charge of war activities and Bernard Dolan is tool conservation campaign manager.



This is a jig in which inner wing for C-47 cargo ship is assembled. Note the three working levels on this massive jig, and towers of which are built of 10-inch steel pipe and weigh nearly three tons each. Towers are set in 2 x 6 foot reinforced concrete islands to insulate the structure from vibration

Colorado Fuel & Iron Adding 74 Coke Ovens

The Colorado Fuel & Iron Corp., Denver, plans construction of 74 coke ovens at its Minnequa steel plant. Colorado Fuel & Iron now has 192 coke ovens at Minnequa, and the new equipment means a capacity increase of around 40 per cent.

The company expects a new iron ore bedding plant and sintering plant at Minnequa to be finished by September.

Officials anticipate that the new open shaft, hoist and head frame being installed at the corporation's iron mines at Sunrise, Wyo., will be completed this fall.

GETTING OUT THE SCRAP

Increased dependence on plant waste stresses urgent need of effective collection systems. . . Improved worker efficiency and morale are programs' byproducts. . . Collection of 15,000,000 tons required before end of 1943

URGENT need for iron and steel scrap has not yet been satisfied. Collection effort must be intensified over coming months if the steel industry's production goal of 92,000,000 tons of ingots this year is to be attained.

For the first half of 1943 the steelmakers established a new production high of 43,866,912 ingot tons. But even assuming that the "Steel for Victory" drive uncovers the desired 2,000,000 additional tons of steel ingots in the last half of the year, this still leaves an even higher new production record of 46,133,088 tons to be achieved during the current six months—that is, output of 2,266,176 more tons of steel than were turned out in the first half. Can the steelmakers do it?

They can if tonnage of iron and steel scrap is increased to the point where steel companies' stocks on hand are always adequate, in the view of government officials. But latest figures from the Scrap Processors Branch of the War Production Board's Salvage Division are not reassuring.

In May auto wreckers and scrap dealers shipped 155,677 net tons of iron and steel scrap to steel mills. For June, however, this figure slumped to 91,548 tons—drop of 41.2 per cent. Number of old cars purchased for wrecking likewise skidded, showing a loss of 32.6 per cent for June compared with May.

Without production of new cars, stocks of old automobiles are shrinking. In June, 1942, auto wreckers reached the pinnacle of tonnage delivery, shipping 454,038 tons to mills. Since then the number of cars wrecked and volume of scrap shipped have steadily diminished. For the six-month period ending December, 1942, an estimated 934,620 cars were scrapped; the six months ending this June the total was only 538,524 cars. Last month some 65,350 junked cars were processed, and it is believed that for the remainder of 1943 the month'y average will be around 55,000—a total of 330,000 for the current six-month period.

This sharp drop in potential scrap material cons itutes a threatening situation in the opinion of the WPB Salvage Division. Paul C. Cabot, who resigned recently as director of the division because of ill health, stated before leaving the post:

"With increased steel requirements for the last six months of the year, our scrap position must be stepped up accordingly. To this end we have increased our collection quota to 15,000,000 tons for the period.

"This means that all salvage workers throughout the country, in all phases of salvage activities, must work harder to make good this increased scrap quota. With less scrap available in the wrecked-auto field, we must work even harder in all other fields constituting sources of iron and steel scrap, such as agricultural areas, railroads, industrial sources, and worn out and abandoned properties. We are assured by the consuming mills that they will take prepared scrap in the areas where they are located. So we have this added incentive to get in all material available.

"Only in this way can we expect to meet the heavy additional requirements placed upon us by the increased steel quotas."

Considering the inevitable decline in stocks of old cars, and the lower quality of household and general collection scrap as supply sources dry up, it seems apparent industrial plants must be depended upon increasingly for the scrap gathered during the July-December period.

This war production "harvest scene" is part of the process of salvaging metal chips and turnings at the Pioneer-Eclipse division, Bendix Aviation Corp., Teterboro, N. J. Chips must be crushed or briquetted prior to remelting

Scrap Collection Pays

Wartime expansion of the nation's industrial plants and their heavy production schedules have brought about development of improved methods for collecting and processing waste metals.

Disposal of plant scrap improves the safety factor, makes for greater efficiency of employes, and improves worker morale. Beyond that many industrial companies are discovering that modern scrap-handling processes return otherwise wasted dollars.

For example, the Perfect Circle Co., Hagerstown, Ind., has found cast-iron borings salvaged from its plants need no longer be termed scrap; they rate as a byproduct. These "chemical borings" are

now being sold to E. I. du Pont de Nemours & Co. for use in manufacturing dyes for troop uniforms. DuPont also uses the borings to produce a chemical needed in reclaiming rubber, and they go directly into the production of smokeless powder and other explosives. Such use of scrap points to the extra dividends possible when every type of plant scrap is utilized to best advantage.

Plant "scrap hounds" are not new, but Willys-Overland Motors Inc., Toledo, O., presents a record of the benefits possible with such a device. The company's "hound" consists of a 4-cylinder jeep motor, a generator, a magnet able to lift a 700-pound manhole cover, and a jeep trailer. Energized by the motor, the magnet is driven around the plant to pick up nails, steel turnings, and other metal objects along the route.

In its first four days' operation the "hound" added 3145 pounds of metal to the Willys-Overland scrap pile. Furthermore, during its first month of use the device reduced by 75 per cent the nail and metal damage of tires on company cars, trucks and tractors; and rejections of jeep tires, because of cuts sustained on test runs, were reduced to a negligible figure by this means.

Some large plants have installed complete systems for exact control of every type of metal scrap with gratifying results. An example of the economies possible can be cited in experience at the Teterboro, N. J. plant of the Bendix Aviation Corp., which is operating a salvage system which the War Production Board recommends as a model for other industries.

Plan Based on Segregation

Basis of this successful system is segregation of metals from start to finish of each manufacturing process through simple card identification. Each month this program salvages 500 tons of steel in 6 basic alloys; 85,000 pounds of aluminum, segregated into 6 groups; 35,000 pounds of magnesium; 35,000 pounds of brass in 10 different alloys; 35,000 gallons of oils and solvents.

As described by its designer, F. P. Joralemon, Bendix Pioneer-Eclipse salvage superintendent, the system is based on a simple plan plus application of mass-production methods, and is operated with less than half of 1 per cent of total plant manpower.

Recovery of metal turnings and oils starts with each working shift, as the plant setup men assign jobs to cutting, drilling or boring machines. The setup man posts on every machine a printed card stating the type of metal and alloy being worked on that machine.

For positive identification the steel alloys are classified in 6 basic groups: high-carbon steel containing no nickel; steel containing 1 to 3 per cent nickel alloy; steel containing 3 to 5 per cent nickel alloy; steel containing molybdenum or "toughener"; chrome vanadium steel; stainless steels. The cards subdivide each group in from 2 to 12 grades. Cards are also printed to classify 4 grades of aluminum, 30 types of brass, bronze, and copper, and 1 type of magnesium.

Cards Are Kept Posted

The machine operators are specifically instructed to keep the cards posted on their machines until each job is completed, to insure positive identification of scrap by types. Then it is the setup man's task to see that each machine is thoroughly cleansed of one type of chips before the change is made to a job requiring another metal.

Cleanup men are provided with oil tight containers built to fit various types of machines and mounted on wheeled carts resembling mine cars. These carts are operated by hand or by electric lift trucks.

As soon as a machine has been cleansed of chips or turnings the scrap-filled cars —each carrying its identification card— are hauled to the salvage department, housed in a separate building. There the oil-soaked turnings are dumped into a hopper and lifted 20 feet by skip-hoist to a sorting table, where butt ends or rough parts are separated by hand before the entire mass is dumped into a crusher.

In the crusher the rough metal is pulverized into what the salvage expert terms "shoveling chips." The crushing process also starts the separation of oil and metal. A belt then conveys the chips into a huge basketlike steel container; a switch is pressed and the container whirls. Within a few moments the cutting oil has been separated from the metal chips by centrifugal force.

Oil recovered in this extractor flows out the bottom of the iron basket into a sump. It is next pumped into a hopper tank, where it is pasteurized at a temperature of 160 degrees Fahr. The oil is then filtered to eliminate powdered metal and slime, after which it is pumped to supply tanks for further issue and use.

Air Conveyor Carries Chips

The oil-free metal chips are next fed into an air conveyor and blown 25 feet into hard steel hoppers. They are then loaded into trucks which carry them to smelters for reprocessing, after which they are put back into use.

System Has New Building

This system for recovering metals and oils speedily and efficiently has been occupying its new building for several months.

By these and similar methods industrial plants are conserving critical metals and aiding the "Steel for Victory" drive in this crucial six-month period. That these efforts are critically needed is suggested by the figures of the Bureau of Mines, with May consumption higher than for April, and month-end stocks slightly down. Scrap consumption for May totaled 4,723,000 tons, against 4,642,000 for April. Scrap stocks on hand at end of May amounted to 6,905,000 tons, compared with a total of 6,918,000 tons shown at April's end.

Cutting oils drain from the bottom of a centrifugal force extractor and are recovered for reuse at the Pioneer-Eclipse division, Bendix Aviation Corp. More than 30,000 *gallons of oil per month are salvaged at the Bendix plant*

Ordnance Plans For Conversion

Chicago district completes termination of 90 contracts. . . H. P. Isham now district chief on terminations

CHICAGO

ALTHOUGH army ordnance production in the Chicago Ordnance District is increasing and the district is administering 3338 prime contracts with total valuation of $3,696,248,799, steps already are being taken to smooth conversion of industry in this area back to peacetime production.

This was seen in the recent announcement by Brig. Gen. Thomas S. Hammond, district chief, that H. P. Isham, ordnance executive, will hold the newly created position as chief of Purchasing, Termination and Renegotiation Policy. He will be assisted by Lt. Col. Francis W. Parker Jr., assistant chief, and will have the co-operation of the Chicago district's price adjustment board set up in August, 1942.

"Our first consideration, of course," Gen. Hammond said, "is to continue to provide American soldiers with the best equipment in the world . . . enough and on time. But we know that the war will end some day in complete victory, and American industry eventually will return to normal operations. When that time comes, we want to be in a position to help manufacturers make the conversion with maximum speed and minimum distress. The men who will handle that work for the War Department in this district will have had sufficiently broad business experience to guarantee the realization of that objective."

Mr. Isham, who has been with the ordnance district since May, 1942, as chief of the planning division, was formerly president of the Clearing Industrial District. Col. Parker, in civilian life an attorney, was a member of Parker & Carter, patent lawyers, until as a major in the ordnance reserve he was called to active duty early in 1940.

Appointment of George F. James, for the past year a member of the price adjustment section, as chief of that section, also was announced by Gen. Hammond. He succeeds William R. Odell Jr., who left his post as assistant treasurer, International Harvester Co., Chicago, a year ago for temporary service with the ordnance district and is now returning to his former position.

"Terminations of contracts are certain to become increasingly important when the war effort passes its peak," Gen. Hammond asserted, "and we are determined that such terminations shall be handled promptly and fairly. Already the Chicago district has completed termination of 90 contracts."

A.F.A. Picks Buffalo for Its 1944 Convention

The third War Production Foundry Congress and the forty-eighth annual meeting of the American Foundrymen's Association will be held in Buffalo, the week of April 25, 1944, according to announcement following the annual meeting of the association's board.

All phases of the event will be housed in Buffalo's Memorial Auditorium.

Provision will be made for suppliers of equipment and materials to demonstrate the utility of their products through use of exhibit booths for conference and consultation and displays of models, products and equipment.

Annual meetings of the A.F.A. have been held in Buffalo twice previously.

BRIEFS . . .

Worthington Pump & Machinery Corp., Harrison, N. J., announces acquisition of Ransome Machinery Co., Dunnellen, N. J., as a wholly owned subsidiary.

—o—

McKenna Metals Co., Latrobe, Pa., has been succeeded by Kennametal Inc. Personnel, management, products and policies remain the same. Directors are Philip M. McKenna, Alex G. McKenna and Donald C. McKenna. The following officers were elected: Philip M. McKenna, president; Alex G. McKenna, vice president; Donald C. McKenna, vice president; George T. Kearns, treasurer, and Robert M. Zacharias, secretary.

—o—

Cleveland Automatic Machine Co., Cleveland, manufacturer of automatic screw machines, has purchased the G & N Mfg. Co., Cleveland, maker of high-pressure hydraulic die-casters. The G & N company will be operated as a division of Cleveland Automatic. Officers are president, Millar Brainard; executive vice president, G. V. Patrick, also vice president of the controlling company; treasurer, James Hammond, Cleveland Automatic Machine Co. president.

They Say:

"If we Americans, in the peace that lies ahead, prepare for World War III with thoughtful adherence to our experiences and lessons of the past, World War III will in all probability never be fought."—**J. Carleton Ward, Jr.**, president, Fairchild Engine & Airplane Corp., and head of East Coast Aircraft War Production Council.

• • •

"There must be more and more industry. It is essential to political and economic freedom, and anything that hinders industry is harmful to the American ideal. Industry can give the only social security human beings can know—the security of being able to produce what they need."—**Henry Ford** on his eightieth birthday, July 31.

• • •

"When we realize that taxes must be uniform, it is clear that further drastic increases would be backbreaking and destructive to the middle class and to the lower upper class."—**Sen. Walter F. George** (D., Ga.), chairman, Senate Finance Committee.

"The first and most difficult phase of the war—overcoming the enemy's initial superiority in arms and in experienced fighting men—is now drawing to a close. Millions of Americans have been trained and equipped for combat, and America's production of war materials has risen far above that of the Axis countries. Our military might has made itself felt in Africa, the South Pacific and the Aleutians, setting the stage for more decisive operations to come."—**B. F. Fairless**, president, United States Steel Corp.

• • •

"There has been so much talk about postwar planning by professors, government and business leaders that the need for such planning by individuals and families has been largely overlooked. Wartime payrolls call for some personal planning on the part of every man and woman now holding a job. There is a real challenge to good sense in every paycheck nowadays. This is particularly true since so many workers are drawing extra pay for longer hours at overtime rates."—**E. J. Kulas**, vice chairman, executive committee, Jones & Laughlin Steel Corp., Pittsburgh, in a statement to employes.

Steel Producers' First Half Net Earnings Slightly Below Year Ago

Second quarter returns show little change from initial three months—Profits sharply below like 1941 periods

COMBINED net income of the first 18 steel producers to report for the initial six months this year totaled $86,827,257, off slightly from the $90,489,745 aggregate net profit reported by the same group in the corresponding 1942 period.

In the first half of 1941 net earnings were substantially higher at $149,527,722.

Sharp increase in payrolls, and to a lesser extent higher material costs were the chief factors accounting for the decline in first half earnings. New records were established in steel ingot output and steel produced for sale during this period.

Tax provisions for the first half reported by 15 companies in the group were off moderately, reflecting the lower earnings before taxes in most instances. Only five of those companies reporting taxes made larger provisions during the first half than in the like period a year ago. Provision for taxes in the first half of 1942 were largely guess work in that estimates were made on the basis of the likely increase in tax rates then in the process of being formulated by Congress. First half taxes for 15 steel interests reporting aggregated $235,223,106, compared with $298,844,021 in the same period a year ago and $138,929,086 for the corresponding first six months during 1941.

Second quarter net earnings for the group of 18 steel producers, representing close to 90 per cent of ingot capacity, amounted to $42,960,382. This was substantially unchanged from the $43,066,874 reported by the like companies in the initial three months this year. In the second quarter of 1942 and 1941 the aggregate net income for this same group totaled $33,742,844 and $64,324,087 respectively.

Allegheny Ludlum's First Half Net Is $2,583,319

First half net profit of Allegheny Ludlum Steel Corp., Pittsburgh, totaled $2,583,319, equal to $1.97 a common share. In like period of 1942 and 1941 the company earned $1,963,362 and $4,169,847 respectively.

Second quarter earnings amounted to $1,164,079, against $1,419,240 in the initial three months this year and $1,047,718 in the June period last year.

Tax provisions for the first half aggregated $10,487,500, compared with $7,324,900 in corresponding 1942 months.

National Steel Has First Half Net of $5,218,865

National Steel Corp., Pittsburgh, reports first half net income of $5,218,865, equal to $2.36 a share on capital stock. In like 1942 period earnings amounted to $5,426,282, or $2.46 a share.

June quarter net profit totaled $2,538,015, compared with $2,680,850 in the initial three months and $2,750,445 in the corresponding 1942 quarter.

Tax provisions for the first half aggregated $12,075,000, against $12,750,000 for the same period last year.

Cleveland-Cliffs Iron Profit Totals $967,674

Earnings of Cleveland-Cliffs Iron Co., Cleveland, are reported at $967,674, equal to $1.98 a share on $5 preferred stock, for the six months ended June 30. In like 1942 period profit totaled $1,874,-

(*Please turn to Page* 158)

Comparison of Steel Producers' First Half and Quarterly Earnings

	First Quarter	Second Quarter		First Half		Taxes First Half	
	1943	1943	1942	1943	1942	1943	1942
United States Steel Corp.	$15,403,597	$15,679,456	$ 5,945,373§	$31,086,053	$33,866,907	$52,800,000	$117,000,000
Bethlehem Steel Corp.	6,228,693	6,614,210	6,070,913	12,842,903	12,211,601	61,610,000	49,400,000
Republic Steel Corp.	3,666,557	2,337,175	3,355,158	6,003,732	8,072,121	29,600,000	35,800,000
Jones & Laughlin Steel Corp.	2,399,369	2,411,248	2,438,752	4,810,617	4,930,470	11,500,000	11,800,000
National Steel Corp.	2,680,850	2,538,015	2,750,445	5,218,865	5,426,282	12,075,000	12,750,000
Youngstown Sheet & Tube Co.	2,147,023	2,257,425	2,291,119	4,404,448	4,867,698	12,613,000	16,377,000
Inland Steel Co.	2,796,321	3,011,333	2,782,391	5,807,654	5,471,481	10,721,000	14,521,000
American Rolling Mill Co	1,535,205	1,694,492	1,602,688	3,229,697	3,334,323	8,219,023	7,131,459
Wheeling Steel Corp.	961,391	1,329,010	795,558	2,290,401	1,995,648	2,433,000	5,346,000
Pittsburgh Steel Co.	600,121	421,403	731,840	1,021,524	1,377,175	.....	.....
Crucible Steel Co. of America	1,915,905	1,798,164	2,170,731	3,714,069	3,846,775	19,374,416	18,133,162
Copperweld Steel Co.	216,332	227,809	258,811	444,141	597,868	21,567†	895,440
Sharon Steel Corp.	445,564	489,871	386,900	935,436	637,202	3,347,000	1,550,000
Allegheny Ludlum Steel Corp.	1,149,240	1,164,079	1,047,718	2,583,319	1,963,362	10,487,500	7,324,900
Granite City Steel Co.	121,560	100,352	176,833	221,912	254,490	137,000	210,000
Continental Steel Corp.	118,159	216,179	234,410	334,338	403,747	284,600	605,060
Follansbee Steel Corp.	187,133	255,803	37,668	442,936	202,976	.....	.....
Keystone Steel & Wire Co.	220,854	414,358	665,536	635,212	1,029,619	.....	.....
Totals	$43,066,874	$42,960,382	$33,742,844	$86,827,257	$90,489,745	$235,223,106	$298,844,021
FINISHING CAPACITY ONLY							
Acme Steel Co.	$422,316	$509,554	$380,285	$931,870	$896,963	$2,875,283	$2,821,251
Eastern Rolling Mill Co.	123,226	48,158	36,479	171,384	175,405	911,208	473,364
PIG IRON CAPACITY ONLY							
Interlake Iron Corp.	$260,430	$230,397	$247,840	$490,827	$692,602	$885,000	$1,070,000
Pittsburgh Coke & Iron Co.	152,311	191,374	202,900	343,686	336,072	270,000	424,955
Woodward Iron Co.	251,815	300,283	66,553*	552,098	330,784	342,173‡	644,651‡

†Gives effect to a net credit of $115,091 for estimated recovery of 1941 excess profits taxes. ‡Excess profits taxes. *Loss. §Includes tax adjustment.

THE BUSINESS TREND

Production Fluctuates Within Narrow Range

INDUSTRIAL production is well sustained at recent peak levels, with most business barometers recording only slight gains or negligible declines. Output of essential war products continues in tremendous volume, despite cancellations in some lines.

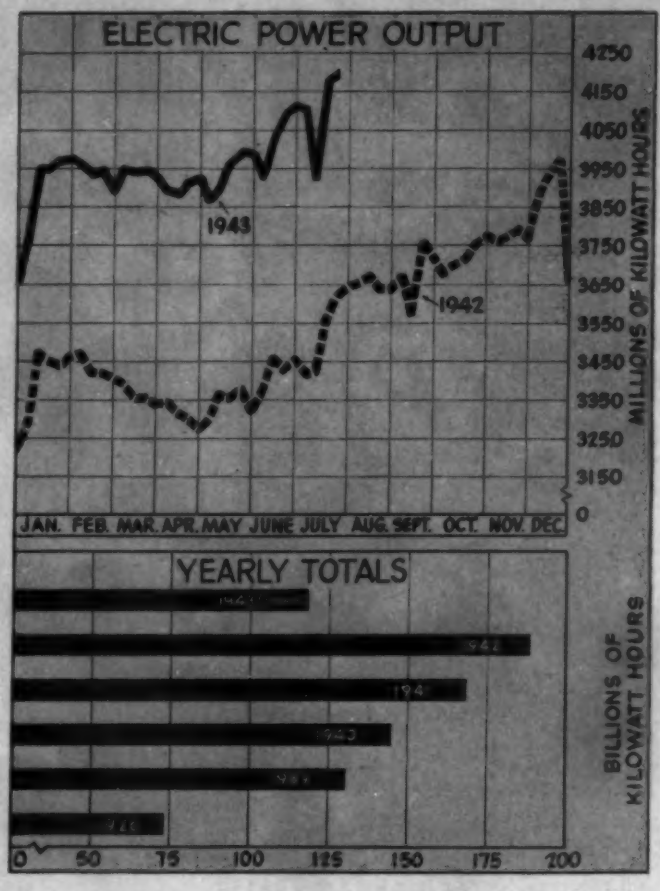
Among weekly industrial indicators slight gains have been recorded in electric power consumption, petroleum production and freight carloadings. Steel ingot and bituminous coal production held unchanged, while slight declines were registered in heavy engineering construction awards and truck and automobile output.

ELECTRIC POWER—New all-time records in electric power generated have been established in recent weeks and further gains are seen for the remainder of the year.

Increase in power facilities from the start of the war program through 1944 is expected to exceed 8 million kilowatts, bringing total installed capacity for class I utilities to 45,000,000 kilowatts and capacity in industrial plants and small utilities to more than 10 million. The war has brought about a 43 per cent increase in power consumption from 1939 to 1942. To date this year there has been a 17 per cent gain in consumption over 1942. Relatively small amount of additional power capacity is scheduled for the duration of the war program.

The electric power systems in conjunction with government officials are proceeding with plans for an intensive nation-wide voluntary conservation program for the purpose of saving manpower, steel, copper, coal, oil, natural gas, tungsten and other critical materials and equipment.

STEEL CASTINGS—Manpower shortage, particularly in the unskilled labor group, continues to limit steel castings production to slightly under 90 per cent of capacity. The industry's war expansion program is practically completed, but despite sufficient plant capacity many interests are behind in meeting war production schedules. Deliveries, while varying widely, appear to average about three months. There is some doubt the 1943 production goal of 3,154,000 tons can be met, due to inability to bring production up to capacity because of manpower lack.



Latest official production figures show a slight upturn during May to 163,812 tons, compared with 161,403 in April, and the all-time peak of 176,470 tons recorded during March. Orders also increased in May to 192,531 tons, but were still below the high point in recent years of 213,130 reported for January.

SCRAP—Decline of 3 per cent in steel and iron scrap stocks held by producers and suppliers during May more than offset a one per cent increase in consumers' stocks, the Bureau of Mines reports. Despite the latest decline, stocks on May 31 last were about 75 per cent above that recorded in the like 1942 month. However, recent curtailment of pig iron production resulting from the coal strike has forced steelmakers to dip further into supplies.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	98.0	98.0	92.0	98.0
Electric Power Distributed (million kilowatt hours)	4,227	4,196	4,111	3,649
Bituminous Coal Production (daily av.—1000 tons)	1,983	1,983	775	1,843
Petroleum Production (daily av.—1000 bbls.)	4,133	4,119	4,008	3,383
Construction Volume (ENR—unit $1,000,000)	$41.2	$49.0	$60.1	$259.8
Automobile and Truck Output (Ward's—number units)	19,900	20,130	18,645	18,260

*Dates on request.

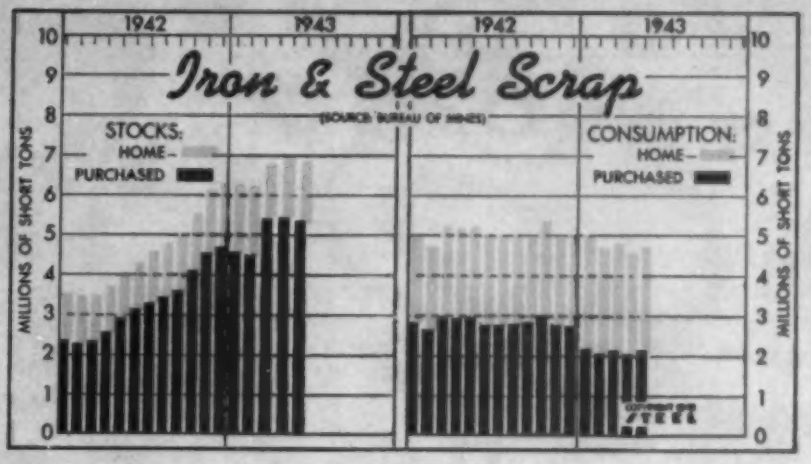
TRADE				
Freight Carloadings (unit—1000 cars)	886†	884	852	864
Business Failures (Dun & Bradstreet, number)	48	50	66	168
Money in Circulation (in millions of dollars)‡	$17,799	$17,706	$17,420	$12,647
Department Store Sales (change from like week a year ago)‡	+20%	−1%	+12%	+5%

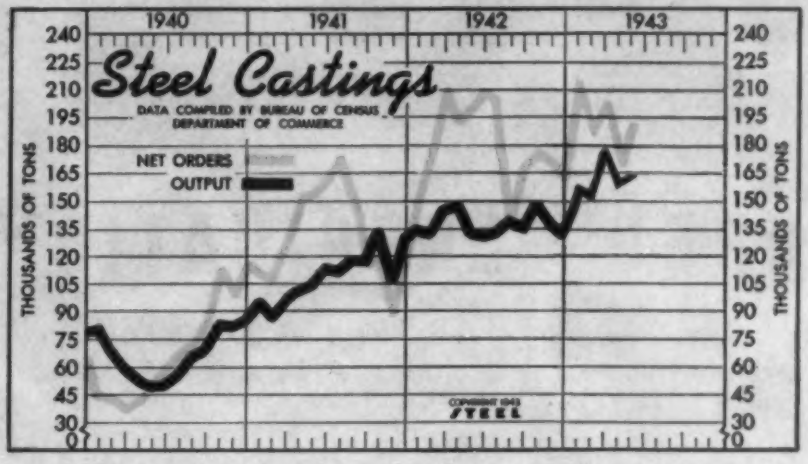
†Preliminary. ‡Federal Reserve Board.

Iron and Steel Scrap
Bureau of Mines

(Gross tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1943	1942	1943	1942
Jan.	6,233	3,503	5,031	4,956
Feb.	6,209	3,455	4,680	4,708
Mar.	6,850	3,460	4,787	5,221
Apr.	6,918	3,582	4,642	5,156
May	6,905	3,972	4,723	5,225
June	.....	.....	4,297	5,000
July	.....	.....	4,579	5,006
Aug.	.....	.....	4,780	5,015
Sept.	.....	.....	4,993	4,955
Oct.	.....	.....	5,530	5,342
Nov.	.....	.....	6,078	4,930
Dec.	.....	.....	6,274	5,037
Total	.....	.....	54,503	60,551





Commercial Steel Castings

(Net tons in thousands)

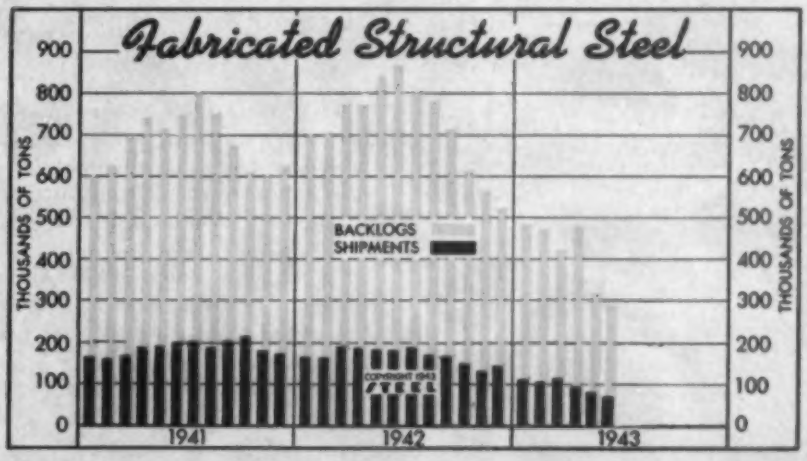
	Orders		Production	
	1943	1942	1943	1942
Jan.	213.1	150.5	154.7	134.8
Feb.	191.2	179.9	151.5	133.7
Mar.	202.7	211.1	176.5	146.5
Apr.	165.8	191.2	161.4	149.6
May	192.5	199.6	163.8	131.5
June	.....	208.9	.....	132.0
July	.....	202.3	.....	135.7
Aug.	.....	141.2	.....	139.2
Sept.	.....	177.5	.....	139.8
Oct.	.....	179.5	.....	152.1
Nov.	.....	173.3	.....	140.4
Dec.	.....	172.3	.....	143.9
Total	.....	2,187.3	.....	1,679.2

Fabricated Structural Steel†

(1000 tons)

	Shipments			Backlogs		
	1943	1942	1941	1943	1942	1941
Jan.	109.9	167.8	164.6	489.3	704.4	601.5
Feb.	109.1	164.6	161.4	475.6	706.7	624.2
Mar.	113.3	191.3	170.2	424.4	777.7	697.2
Apr.	96.5	187.2	189.8	385.3	772.4	741.9
May	88.5	184.2	191.9	306.6	843.8	718.9
June	77.6	182.7	200.5	290.3	869.8	747.4
July	.....	189.9	203.0	.....	808.6	802.7
Aug.	.....	173.9	189.3	.....	783.5	754.5
Sept.	.....	169.8	204.1	.....	716.0	678.5
Oct.	.....	152.9	217.7	.....	617.7	614.4
Nov.	.....	130.4	182.6	.....	566.6	602.9
Dec.	.....	145.3	176.1	.....	523.5	626.0

†Source: American Institute of Steel Construction.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	$7,936	$8,612	$8,503	$6,221
Federal Gross Debt (billions)	$144.8	$144.4	$140.7	$81.6
Bond Volume, NYSE (millions)	$70.1	$61.8	$64.0	$31.4
Stocks Sales, NYSE (thousands)	8,162	4,714	5,279	1,490
Loans and Investments (millions)†	$46,612	$46,822	$46,147	$33,396
United States Government Obligations Held (millions)†	$32,510	$32,287	$31,753	$17,178

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	243.8	244.2	245.4	230.0
Industrial Raw Materials (Bureau of Labor index)†	113.3	113.4	114.2	99.8
Manufactured Products (Bureau of Labor index)‡	99.8	99.6	99.7	98.8

†1931 = 100; Friday series. ‡1926 = 100.

THOMPSON AIRCRAFT PRODUCTS CO.

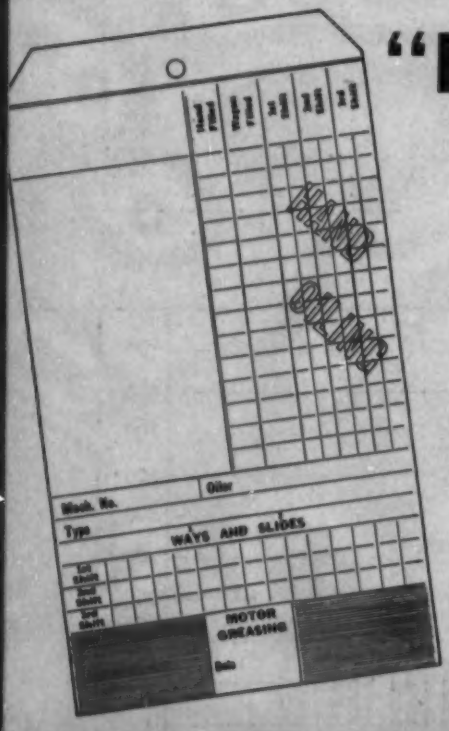
LUBRICATION LOG

RECORD DATES OF ALL OIL CHANGES ON ITEMS DESIGNATED

TYPE OF LUBRICATION	PERIOD	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE
	1 WEEKS									
	3 WEEKS									
	MONTHLY									
	6 WEEKS									
	2 MONTHS									
	3 MONTHS									
	4 MONTHS									
	5 MONTHS									
	6 MONTHS									
	YEARLY									

MACHINE 1 3 5 7 9 11 13 15 17 19 D. P. C. 21 23 25 27 29 31 J F M A M J J A S O N D

Fig. 1. (Left)—Visible file card for system that automatically assures lubrication will occur at proper intervals by providing data for daily work orders to lubricating crew



"PLANNED" LUBRICATION

. . . . cuts machinery repair and down time, reduces grease and oil inventories, enables new workers to do effective lubricating job, lowers costs

By O. M. ALBL
Lubrication Engineer
Thompson Aircraft Products Co.
Cleveland

"SAY, BILL, this makes the second time this week that the hydraulic pump on this machine has gummed up; the other machines like this one are getting just as bad. Something has to be done about it".

"Well", answered Bill, "I put the oil in that the manufacturer recommended; I'm not going to stick my neck out by trying some other oil."

"Yes, and what about the slides on the No. 2 centerless grinders? They have to be scraped in almost every month. We have at least three or four jobs down a week."

"Well, I put grease on some and 600-W on others; you have to satisfy the operators; they're fussy about their machines."

It was conditions like these and many others which gave the machine repair department of Thompson Aircraft Products Co. a headache. The general foreman was in the middle, since he was in charge of both repair and lubrication departments—a tough spot for any man —no buck passing here. A general lubrication man seemed the answer to the problem.

He was hired and soon after, the lubrication department evolved a pro-

Fig. 2. (Center, left)—Daily record card is punched in appropriate square every time a "lube" job is performed. These, with permanent record, provide full account of lubrication

Fig. 3. (Left)—Visible filing system answers questions as to when, how and with what a lubrication job was performed and indicates when it should be done again. Left to right: O. M. Albl, lubrication engineer; Wm. Galinas, supervisor; E. B. Finley, general foreman, machine maintenance

gressive plan of lubrication systems and methods. The first thing done was to make a survey of the lubricants used in each machine and to record them. This record served as a basis from which to work. In the forge shop and the heat treat it was found that a high priced automotive motor oil was used where a low priced machine oil was recommended. Here, a duplication of hydraulic oils; there, several cylinder oils where two would suffice, etc. Needless to say, these extra oils were eliminated along with many others.

In the end, 40 per cent of the oils were disposed of and 40 per cent of the headaches with them, since the possibility of applying the wrong lubricant was cut by the same percentage. Bookkeeping and other records were simplified, too.

A second survey was made, at which time recommendations were recorded for the proper lubricants for each type of machine and equipment, keeping in mind the manufacturer's recommendations, the oil company's recommendations, and our own past experience.

Samples of the lubricants were then submitted to the plant laboratory where they were approved by the chief chemist after extensive tests. The rule is that all lubricants must first be approved by the chief chemist before actual testing or use in the plant.

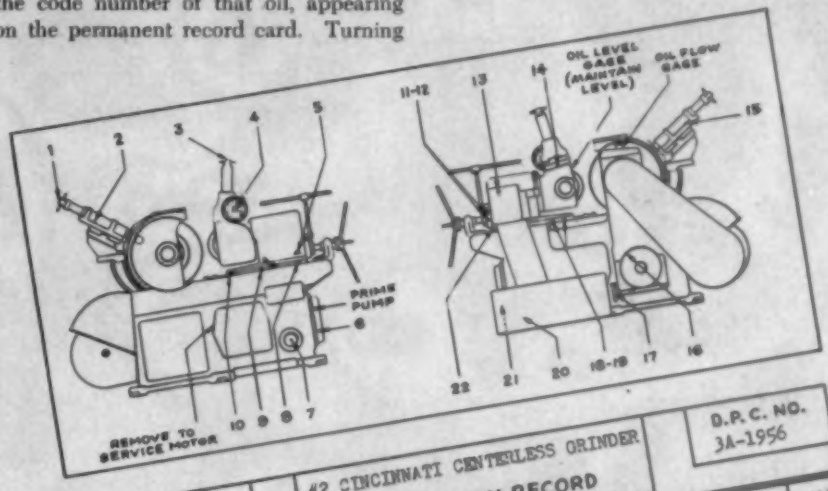
Yes, the lubrication man stuck his neck out and tried a straight mineral oil in place of an oil with an additive over the objections of the machine manufacturer. It worked. The machines ran for a period of from 3 to 5 months without gumming up, and without changing the oil.

The slides? Oh, yes. This problem brought up two questions: One, the frequency of lubrication; two, definite recommendations for each type of machine.

Taking the latter first, a permanent record card was found to be the answer.

A transparent envelope is attached to each machine in which the permanent record card, Fig. 5, is placed. This bears the machine name, number, bay in which it is located, name of the parts to be lubricated, code of the oil opposite the part name, the gallon capacity and the station numbers. The station numbers correspond to the numbered arrows on a photostatic copy, Fig. 4, of the machine, placed in the transparent envelope so it can be seen from the opposite side. The numbered arrows on this diagram designate each point to be lubricated; the numbers of the arrows using the same lubricants are listed opposite the code number of that oil, appearing on the permanent record card. Turning to the reverse side of the permanent record card, the date is posted under the category of lubrication performed, providing the frequency is longer than a two-week interval. Those occurring more often are listed on separate cards. There are over 60 of these special jobs. On the cards the machine part to be lubricated is listed, together with the future dates, usually covering a period of several months. For example, when all the spindle reservoirs using a mixture of kerosene and oil are drained and flushed, the date is punched out on the

(*Please turn to Page 99*)



DEPT. NO. Bay 2

#2 CINCINNATI CENTERLESS GRINDER

LUBRICATION RECORD

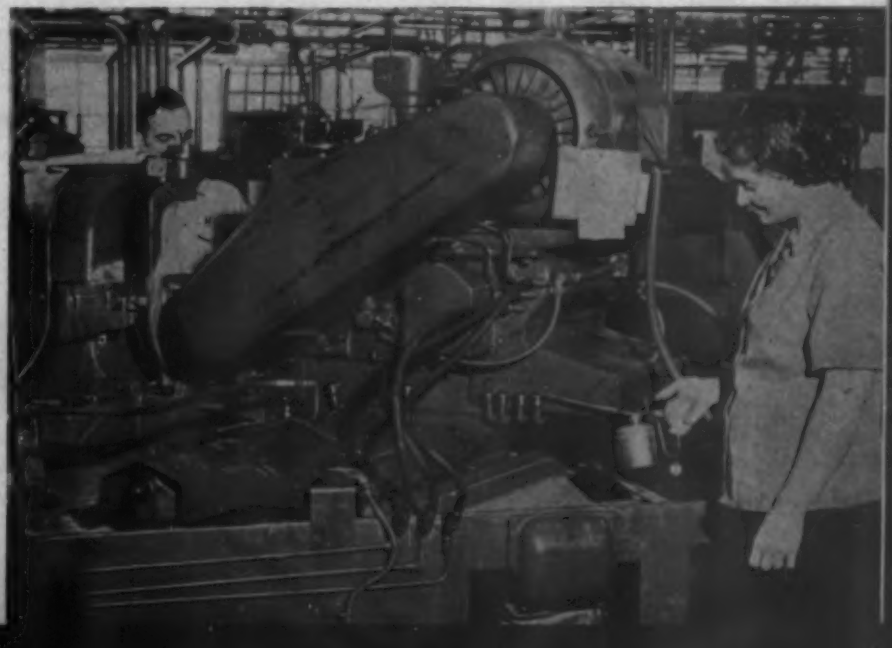
D.P.C. NO. 3A-1956

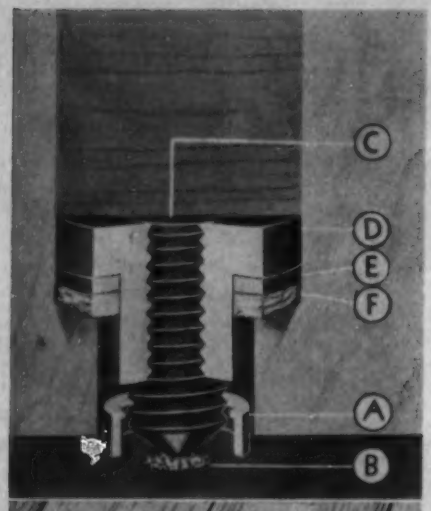
PARTS TO BE LUBRICATED	LUBR. NO.	METHOD	STATION	GALS.
Spindle bearings-hydraulic system	S-12	Main reser.	17	10
Tractor wheel	S-12	Wick feed	14	1/4
Speed change transmission	S-12	Splash	6	1
Hand oiled parts	M		1-2-3-4-11-12-13-15	
All grease fittings (except pump)	600W		5-7-8-9-10-18-19-20-21-22	
Motor bearings	HS-2	Oil lubri.	Remove to service motor	
Coolant pump	G-2	Gun	Not on later models 15	

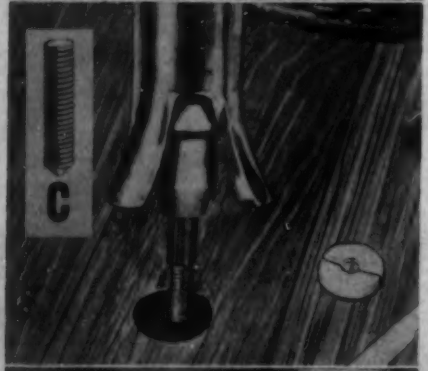
Fig. 4. (Top, right)—A chart like this is visible through back of transparent envelope and is used to show points where lubricant is to be applied to machine

Fig. 5. (Center, right)—Card carried in front of transparent envelope attached to each machine to show permanent record of parts to be lubricated, lubricant, method and where work is to be done. Amount of lubricant is also shown

Fig. 6. (Right)—Lubrication system permits inexperienced workers to do reliable and expert job of lubrication because they are definitely instructed as to what lubricant to use, where to apply it, and how much. It's all in writing and chart form, they need not depend upon their memories to do the job correctly







Stud welding

. . . . automatically assures perfect welds in applying studs or other metal sections endwise to plates or similar flat surfaces; is particularly suitable for application of hold-down studs through planking on ship decks

A METHOD of stud welding with all operations under precise automatic control was designed especially for use in ship deck work and is described for this application. However, it fully meets the requirements of many other uses calling for the end-welding of steel sections to metal surfaces. These operations can be performed at substantial savings of both time and material.

Due to its automatic operation and the production of perfect welds without long training and experience for the operator, welding by this method is made practical for a large number of applications where other methods have not been satisfactory.

Advantages of Welded Stud Deck Fastening: The costly operation of drilling holes through the metal deck is eliminated and the deck plating remains watertight with no danger of seepage through loosened bolts.

—Deck planking may be laid at any time—there is no necessity for delaying interior work until deck bolts have been installed. There is no interference with wiring, ducts, fittings, etc., on the underside of the deck and the studs may be "spotted" at any point—even over deck beams.

—In the wood planking itself, a much smaller hole is required for the installation of a given size stud than by any other method, thereby retaining greater strength in the planking. The stud fits snugly into the lower part of the hole and the wood is protected from heat of the arc by a lava ferrule.

—The shoulder in the counterbored hole can be made wide enough to give shearing strength in the wood planking equal to the strength of the stud.

—The special form of fastening nut used on the stud allows for a much deeper hole for the wood filler plug, materially increasing the life of the planking since the greater usable thickness permits more replanings; see Fig. 1.

—The cost of studs and nuts is frequently considerably less than the cost of bolts required by the older methods.

—Finally, there is a great saving in the time and labor necessary for installation and complete freedom in the location of studs so that they may be placed to the best advantage. Highly trained labor is not necessary.

—The gun is simple to operate and eliminates personal judgment because all operations are automatic and do not require skill nor long training for the operator. The construction throughout is rugged and capable of standing continuous hard use, with the weight of the tool kept low by the use of light metals and alloys so that the operator can work rapidly and without tiring.

With very little practice the ordinary

From top to bottom, left—

Fig. 1—Cross section through National stud weld and fittings as used in application of deck planking

Fig. 2A—Lava ferrule is dropped through hole in planking, first step in process

Fig. 2B—Second step is to pour in a measured amount of arc inducing material or flux

Fig. 2C—Third, the cocked and stud-loaded gun is inserted in hole, trigger pulled, weld automatically made. For gun details, see Fig. 3

Fig. 2D—Fourth, stud is used as hold-down bolt by applying special nut fitted with a grommet and washer as shown here and in Fig. 1. Nut is tightened with T-wrench

operator can consistently produce 150 *perfect welded studs per hour.*

The method combines arc welding with impact or forge welding. The duration of the arc is automatically controlled by an electric timer in the control cabinet. At the exact instant the molten crater has been formed, the gun plunges the stud into place in the molten metal and holds it in precise position. The operator simply cocks the gun, places it in position and presses the pistol grip trigger. The entire cycle is then completed automatically and the gun is withdrawn.

The result is uniformly perfect welds, so strong that the stud will break through the body before it will break at the weld. Automatic action permits the welding current to enter the gun only at the precise instant of welding. At all other times the gun is "dead" so that there is no danger of accidental arcs or of the formation of an arc on the stud when the gun is withdrawn. Loading and cocking the gun are so simple that they can easily be performed by a blindfolded operator.

How It Is Done: With the wood deck planking laid in position and with holes bored where the studs are desired, the operator simply loads and cocks the gun, inserts the lava ferrule in the hole, drops in a metered amount of arc inducing material, places the gun over the hole and presses the trigger. The entire welding operation is automatic. The stud is then ready for the special nut assembly. Less than 30 seconds are required for the entire operation. No skill is required.

Fig. 1 shows a section through deck plank and complete setup for a National stud weld. The letters refer to the parts and steps shown in Fig. 2.

Let's see the procedure in operation: In Fig. 2A, the first step, the lava ferrule is dropped into the hole and serves to shield the wood planking and the stud threads from the flare of the arc. This eliminates one of the greatest difficulties in other methods of welding. The heat and flare of the arc is completely shielded. The ferrule also serves as a protecting medium for the arc and molten metal similar to the covering on shielded arc electrodes.

In Fig. 2B, a measured spoon of arc inducing material is being poured inside the ferrule. This serves to establish the arc and improve the quality of the weld metal. The stud itself does not touch the metal plate until after the molten crater has been formed.

In Fig. 2C, the cocked and stud-loaded gun is shown located over a hole in plank. No welding current flows until the operator presses the pistol grip trigger. This starts the complete welding

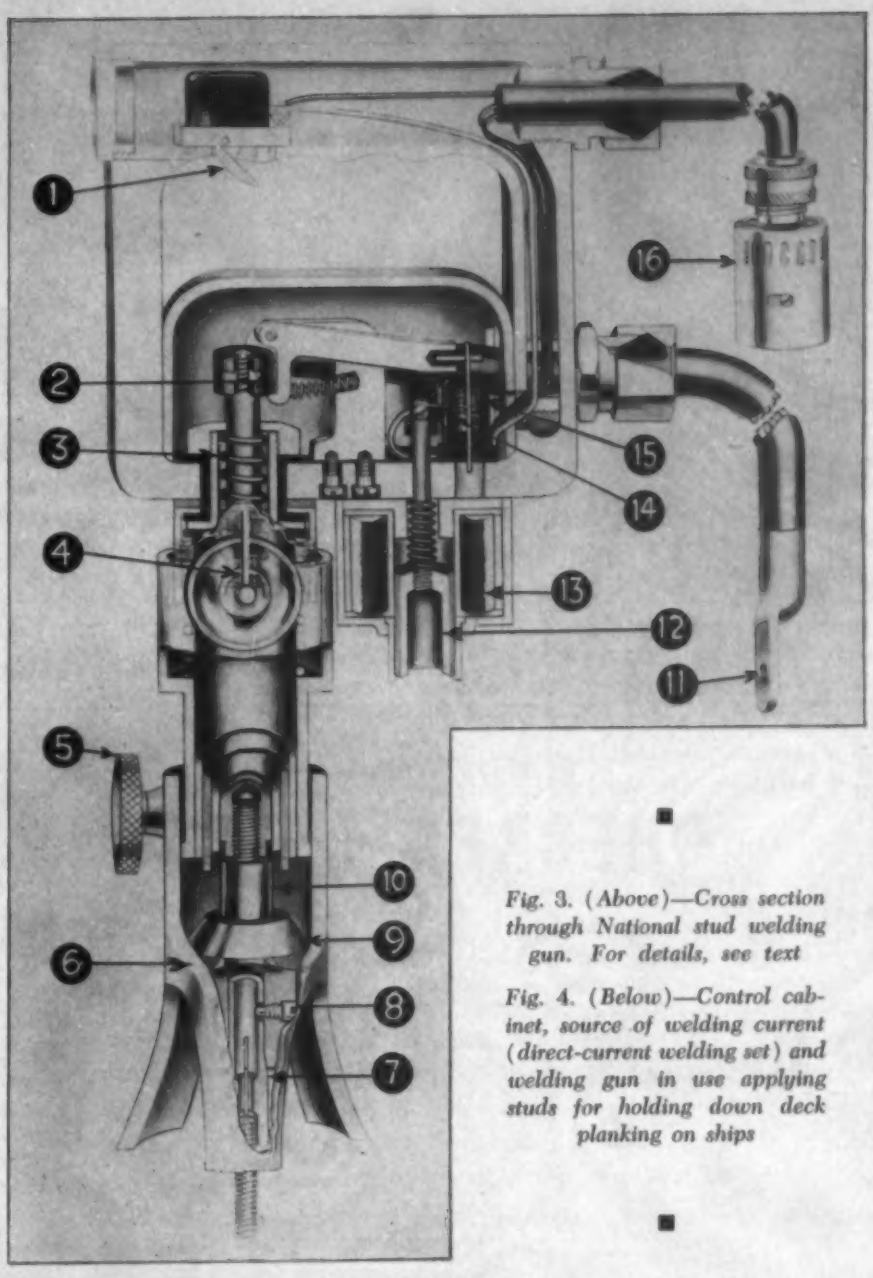


Fig. 3. (Above)—Cross section through National stud welding gun. For details, see text

Fig. 4. (Below)—Control cabinet, source of welding current (direct-current welding set) and welding gun in use applying studs for holding down deck planking on ships

cycle. The current flows for approximately a third of a second; then, as the welding current is interrupted, the gun automatically plunges the stud into the molten crater and the "dead" gun is withdrawn, leaving the stud welded in place.

In Fig. 2D, the stud is shown ready for fastening. A shipwright follows the welder and applies the special nut fitted with a grommet and washer on the stud. A forked T-wrench tightens the nut. A wood plug with white lead seals the hole. Notice the depth of wood available for replaning as shown in the section drawing, Fig. 1.

The process is easily adjustable to various plank thicknesses, stud length and stud diameters. A standard wrench and vise are the only tools required to change adapters. The adjustments required for minor variations in plank thickness to bring the stud in contact with the steel plate, are made with the large knurled nuts. Interchangeable collets handle different studs.

Preparatory work is simple and easy. Stud holes are bored in planks before they are placed in position. Each stud is welded to the deck plate through a hole after plank is in place. The use of a square-end drill is recommended to remove paint and scale from the metal deck at the bottom of each hole. Installation of nuts and plugs is usually done by a shipwright who follows the welder.

Foolproof Safety Features: The automatic control permits welding current to flow only during the fraction of a second when crater is formed. At all other times the gun is "dead" and its interlocking control prevents current from entering the gun unless it is cocked. Accidental shorts and flashes are thereby eliminated when the gun is being withdrawn after making a weld.

Loading the gun is extremely simple —the operator simply inserts the stud in the collet. The gun is cocked by pressing the stud against the planking. This compresses the spring which is automatically released just prior to completing weld. The only other operation is to press the trigger switch which initiates the welding cycle when the gun is in place.

Examination of a polished and etched section through a 7/16-inch diameter stud welded to a plate in the downhand position shows the depth of penetration into the plate. The stud, having been at negative terminal of the arc, is fused to a blunt point which is surrounded by a fillet of weld metal. About ⅛-inch diameter section at the stud end is welded directly to the plate by the forging action of the process. The fillet of weld metal is produced largely from the end of the stud which loses about $\frac{3}{16}$-inch of its length in this process.

(*Please turn to Page* 124)

Develops Cross-Vent

CHECKER BRICK

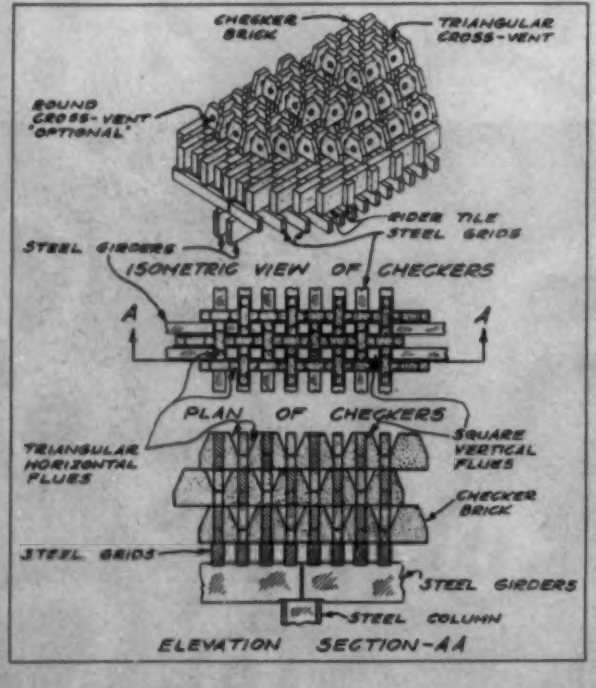
A NEW type checker brick has been developed for blast furnace stoves and other regenerative furnaces which is a simple and cheap shape to manufacture. Checkers made of this shape have a high heating surface because of the large percentage of brick volume exposed to air and heat.

Thickness of the brick and size of the flues can be adjusted to suit any degree of cleanliness. Beveled-off corners of cross vents are staggered thus compelling the gas to impinge on the opposite flue surface in passing from one flue to another. This arrangement of cross vents and holes creates turbulence and heat exchange in the flue corners where the gas is inclined to be inactive and also permits an equalization of heat and pressure over the entire checker area.

The shapes are stable with the center of gravity below the center of the brick and are laid up in standard basket-weave style with alternate courses interlocked. They were designed by J. J. Seaver, vice president, Day & Zimmerman, Inc., Philadelphia.

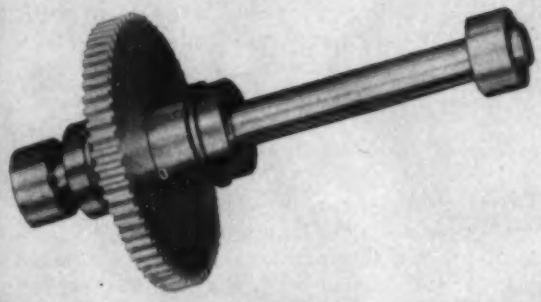
Model of Seaver-type checkers showing arrangement for laying up

Seaver cross-vent checkers for regenerative stoves and furnaces



This Stainless Strip is easy to bend—and is ideal for products like resistor units, where temperature changes must not affect the metal's electrical characteristics.

How you can take advantage of Carpenter's experience with Stainless Steel . . .

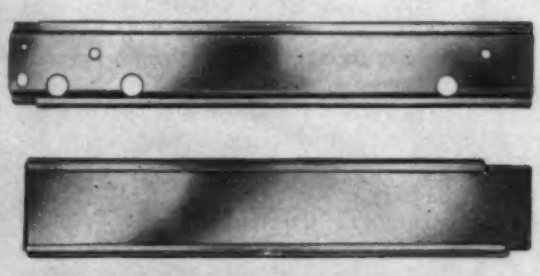


Constant uniformity *from lot to lot—plus unusually close Stainless bar tolerances—helped one manufacturer turn this specialty war product into a mass production item.*

From your engineering department to final inspection floor, Carpenter can help you lick tough problems involving Stainless Steel.

In the shop, your nearby Carpenter representative can often offer suggestions to help you speed output, reduce rejects and cut scrap loss. He can provide useful information on fabricating operations and the properties provided by various types of Stainless.

And for cooperation in working out your product-design problems, get in touch with Carpenter's Metallurgical Department. Add our many years of experience with Stainless problems to your design-engineering knowledge—and together we can work out the solution.



Severe bending, *forming and punching can be done faster when uniformly annealed Carpenter Stainless Strip is used for parts like this radio slide channel.*

Here are Fabricating Helps and Design-Engineering Data

Ask for your copy of this cross-indexed working data book. It is free to Stainless users in the U. S. A. and can really help you find *quick* answers to your questions about Stainless Steels for:

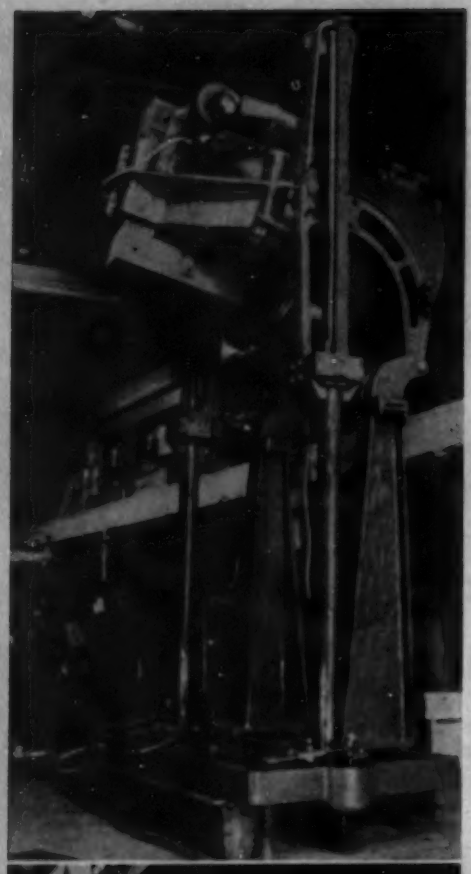
- √ *Special Corrosion Resistance*
- √ *Highest Tensile Strength*
- √ *Heat Resistance Properties*
- √ *Uniform Electrical Resistance*

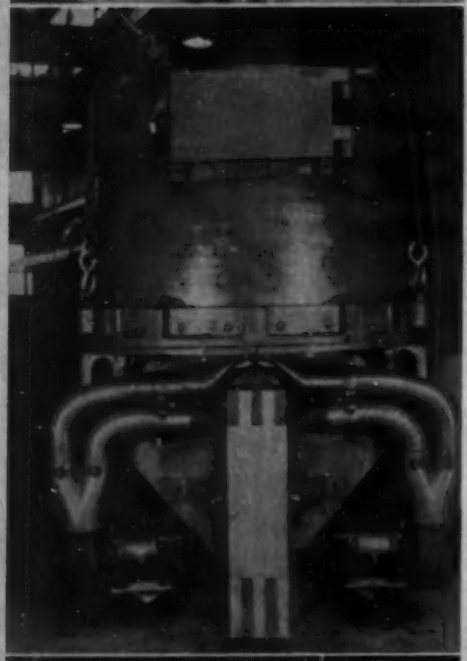
This book also contains a helpful 24-page Fabricating Section, Glossary of Terms, Tables, etc. For your copy of "Working Data for Carpenter Stainless Steels", drop us a note on your company letterhead.

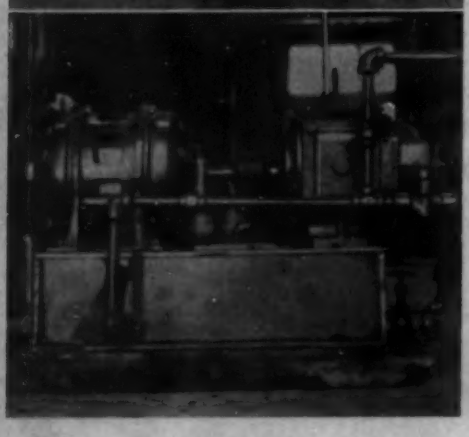
The Carpenter Steel Company • 139 Bern Street, Reading, Penna.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia







Making Custom Built Furnaces . . .

on a

PRODUCTION LINE

By HOWARD LINN EDSALL
Ajax Electric Furnace Corp.
Philadelphia

SPECTACULAR production of war machines on a large scale has interesting parallels in the manufacture of heavy equipment, an unusual case being the Ajax Electric Furnace Corp. Ajax is producing 175-kilowatt Ajax-Wyatt low-frequency induction melting furnaces, units widely used in the copper and brass industry.

These furnaces are simple in operation and appearance but contain some 4000 parts. Until the abrupt demand for 4 million pounds of additional capacity came at the outset of the war, they were made one by one. These were mostly in the 75-80 kilowatt range with a capacity of 1200 pounds per hour. Only eight of the large spout tilting type now required had been made in the past decade.

The production of furnaces was comparatively simple for Ajax before the war when the brass mills were increasing capacity progressively and when interchangeability of parts was less important. Each brass mill usually required an individualized furnace to fit its own peculiar requirements and layout and these were literally hand-made by veteran Ajax furnace erectors.

The situation became acute some time before Pearl Harbor when demand for wrought brass and cupro-nickel jumped from around 9,000,000 pounds a day to 23,000,000 and upward. Ajax was faced with the problem of developing a production method that could deliver completed induction furnaces as fast as newer and larger rolling mill equipment. If it could not be done, then the alternative might have been to melt by crucible practice as used long ago. But aside from high metal losses under such practice (20,000 pounds of zinc used to go up the stacks at one plant), there remained the grim and inescapable shortage of Madagascar graphite to meet tremendous crucible needs estimated at scarcely less than 30,000 pounds a day.

These factors together with the larger floor space and elaborate equipment needed and inability to control mixtures to present requirements would tend to make delivery of cartridge brass difficult, if not impossible, under any other practice.

Ajax had two alternatives in attacking the problem of greatly increasing furnace production, first to multiply by 30 the force of induction furnace specialists. But, this was impracticable because of the handwork, supervision and precise know-how required in electric furnace building.

The second involved development of practicable jigs, fixtures and machines for fabricating furnace halves, middle castings, tilting mechanism bearings, arms, brackets, hydraulic cylinders, steel rings, shell tops, covers, transformer and coil parts, switchboards and busses by mass production methods.

In one of those momentous drafting room and planning sessions where industry always has its birth pangs, a group of key engineers headed by J. R. Wyatt, inventor of the furnace, decided to follow the second course. Soon blueprints were piling up, building walls were broken through and apprentices were being trained for the work ahead. In setting up the new production facilities, considerable resourcefulness and ingenuity were required to keep pace with manpower losses and to improvise equipment which could not be obtained quickly from manu-

Fig. 1. (Left, above)—Complete furnace set up on floor in Ajax plant shows construction details. Note length of extended ram movement

Fig. 2. (Center)—Shown here are the furnace shell, bottom ring and the two lower castings which house and support the transformer and cooling ducts

Fig. 3. (Below)—Reservoir for the hydraulic system is welded from ½-inch plates. Pressure is supplied by a direct-drive pump

PORTER 80 TON DIESEL ELECTRIC SWITCHER

TWO COMPLETE POWER PLANTS

ARMY E NAVY

PORTER
"Better Built"
Locomotives
Established 1866

Designed to provide instantly-available motive power for a wide range of switching jobs, the 80-ton Porter Diesel-Electric sets a new high standard of availability and low-cost operation. Modern in every respect, the new PORTER has many features of advanced engineering design, placing it far ahead of its field. The locomotive illustrated is powered by two independent 250 h. p. Diesel-Electric units. Thermostatically-controlled oil cooling system insures proper lubrication at low cost. Safety platform with steps at all corners speeds up switching operations. This mighty 80-ton Porter is an ideal unit for all heavy switching purposes. Complete description sent on request.

ONLY PORTER BUILDS A COMPLETE LINE OF LOCOMOTIVES FOR INDUSTRY

H. K. PORTER COMPANY, INC.

PITTSBURGH PENNSYLVANIA

facturers. At the same time, it was necessary to carry on the work of producing furnaces by hand, in the former way. Even so, only 68 days were required to make the change-over to semi-mass production.

The construction of Ajax furnaces is complicated by the oddly-shaped components, especially the tilting mechanism and the complicated bottom and middle furnace castings which house the transformers and cooling system. Fig. 1 shows a complete furnace set up on the floor in the Ajax plant and tilted to emptying position. The long ram is braced at full extension beyond the hydraulic cylinder by means of a structural member called a "tilting" link to which the furnace is coupled through roller bearings. Complete furnace units, of course, include transformers, oil reservoir and pumps, controls and switchboard panels. In setting up the new production facilities, it was necessary to standardize parts as much as possible although meeting the specific requirements of individual brass mills.

Melting Chamber Shell ½-Inch Plate

The furnace melting chamber is housed in a shell of ½-inch tank plate. This shell is rolled into proper shape, welded and subsequently riveted to a cast-steel bottom ring. A refractory material is rammed between the shell and the melting chamber in the course of the assembly operation.

From a production standpoint, the cast-steel bottom ring is largely a foundry problem since it is 1-inch thick with a diameter of 49 inches, further complicated by an additional flange and angle section along its periphery to which the middle and bottom castings are bolted. It is bored and faced on a 5-foot Cincinnati vertical boring mill. The shell is mounted within it and riveted fast after tack welding in position.

To the lower half of this bottom ring is bolted the 900-pound semi-steel middle casting. This consists of two semi-circular plates ending in a box-like opening with sidewalls which support the wind boxes as may be noted in Fig. 2. This casting is poured in two halves and when assembled forms a shape 53-inches in diameter by 12⅝ inches deep. The halves are fitted and planed as a unit, being faced on a New Haven planer, jig-drilled and slotted on a shaper for alignment with the tilting mechanism trunnion rollers. Other manufacturers with similar problems will find this method facilitates both machining and assembly operations.

Duct and wind-box openings are hand finished. In fact, all facing surfaces are machined and ground for the purpose of eliminating stresses which might crack refractory linings.

The bottom casting, similarly made in two halves, weighs 800 pounds, being divided to break the electrical fields. It houses and supports the large transformer and the edgewound primary coil. It also supports the blower system and the air ducts in conjunction with the middle casting as may be seen by again referring to Fig. 2.

Neither of these castings is of a form suited to jig drilling. Hence hand work is used throughout, involving a series of separate layouts on faceplates for drilling and machining. This work is complicated as indicated by the fact there are 50 openings in each half of the bottom casting alone on six separate planes. All must be finished accurately to facilitate interchangeability, repairs or assembly with spare parts.

Openings are cut in the bottom casting segments on a drill press after facing on a boring mill. Smaller holes are drilled on radial drill presses. Brackets and pads for mounting the transformer are finished on a boring mill.

Fig. 4 shows a drill press which has been fitted out as a special purpose machine for edge-winding the transformer primary coils. Soft, annealed copper strip up to 1½ inches wide by ½-inch thick is shaped by a series of forming rollers into coils ranging in inside diameter from 7 to 11¼ inches. The coils then are pulled up tight on a mandrel after insulation is inserted.

Transformers are C-shaped with a butt leg. Silicon steel sheets measuring 36 by 108 inches, 28-gage, are cut singly on a Niagara shear and notched on a progressive pattern to form the center so that when assembled the center leg will be circular in form for the primary coil windings. Tie holes are punched on a Chicago Steel press brake and then trimmed and ground for smooth facing.

Accurate Shearing Essential

In order to make the large number of transformer sheets required, it was necessary to obtain a clean shear within tolerances of 0.003-inch in 6 feet to permit punching rather than blanking with accurate holes and centers. Otherwise, unless shaved as bolted, sheets might vary as much as 0.005-inch in dimensions at the butt joints where perfect face contact is necessary for an efficient low-loss magnetic circuit in transformers involving up to 30,000 amperes in secondaries.

In building the cores, sheets are assembled on their cover plates, one by one, until the core mass is 8 inches thick. About 512 sheets are required to a side. These are fitted over insulated bolts and pulled down with a pressure plate. A test winding is slipped over the core, the butt-leg bolted fast to the "C" and electrical tests made with no-load full voltage for leaks, shorts and open circuits.

The ram and cylinder of the tilting mechanism, to which reference already has been made, carry 98 per cent of

(*Please turn to Page* 126)

Fig. 4—Ajax engineers designed this special machine for winding transformer coils on edge from copper strip

Some of the many and varied parts inspected by Jones & Lamson Optical Comparators.

PRODUCTION INSPECTION BY OPTICAL PROJECTION

Comparison Inspection of production parts and products with **Jones & Lamson Optical Comparators** sets new standards for speed and accuracy in production inspection.

The most complex forms can be inspected with a rapidity and precision unobtainable by other methods, by operators with a minimum of training or experience.

There is a **Jones & Lamson Optical Comparator** for every need in the field of inspection by optical projection, and our inspection engineers are ready to study your inspection problems and make recommendations based upon more than twenty years experience in this field.

Photo courtesy The Eastern Machine Screw Corporation.

Universal Turret Lathes . Fay Automatic Lathes . Automatic Thread Grinders . Optical Comparators . Automatic Opening Threading Dies

JONES & LAMSON MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.

Profit-producing Machine Tools

Latest List of

AMS (Aeronautical Material Specifications) STEELS

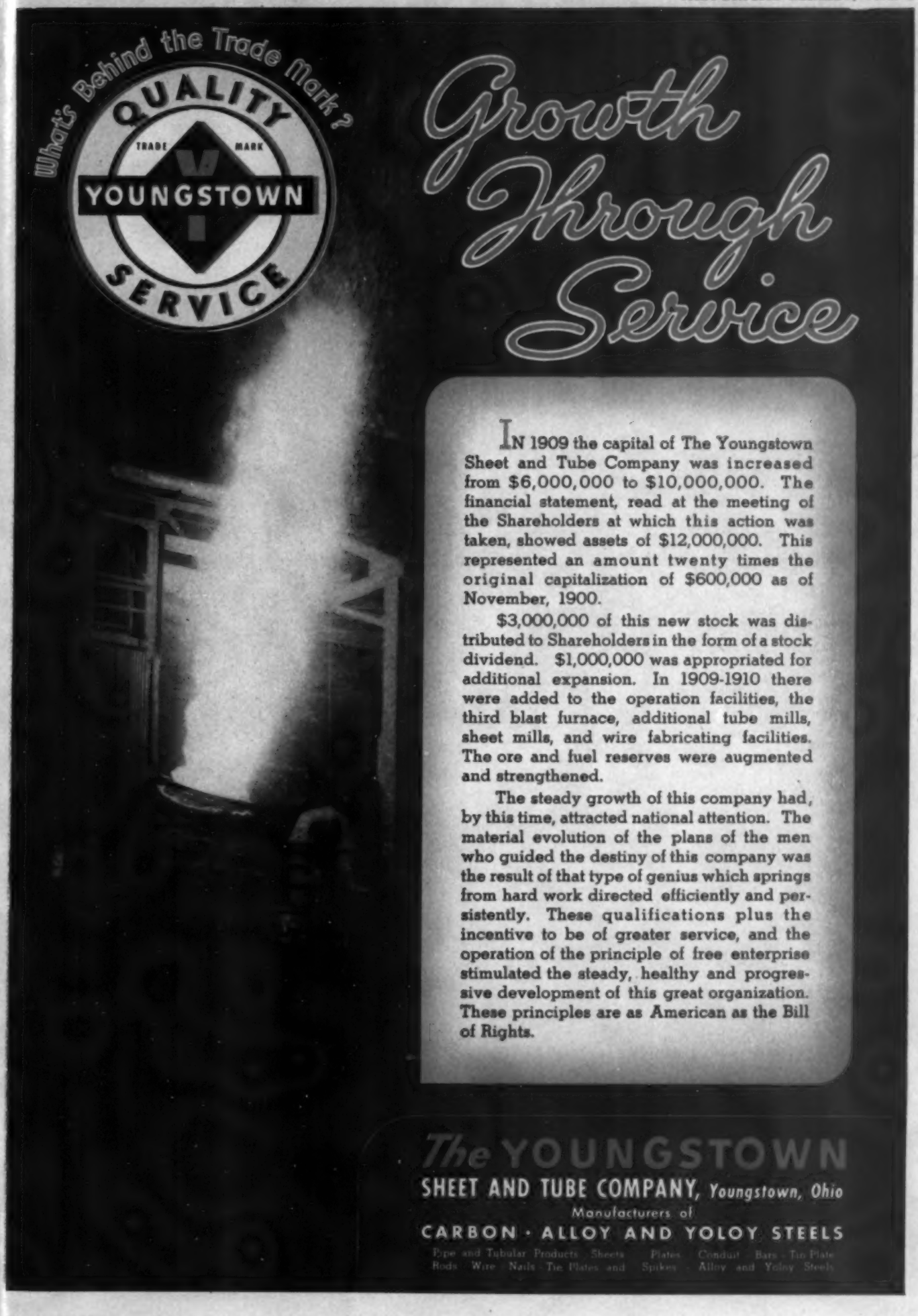
and Nonferrous Alloys

ACCOMPANYING chart lists the latest specifications for AMS (Aeronautical Material Specification) steels as standardized by the Society of Automotive Engineers Inc. and other associated engineering societies, representatives of federal agencies and aircraft manufacturers. Latest revision was in April of this year.

In addition to steels, specifications are listed for aluminum, magnesium and copper alloys; other AMS specifications not listed cover such processes as plating zinc and cadmium, spraying aluminum, various protective and finishing treatments, pressure testing, magnetic inspection, methods of identifying machined parts as well as castings and forgings. Another set of specifications covers nonmetallics such as corrosion preventatives; enamel, solvent, sealer and thinner compounds; synthetic rubbers; gaskets; electric cable and the like. Address the society at 29 West 39th street, New York, for details.

AMS No.	TITLE OF SPECIFICATION	SAE No.	SIMILAR A-N AERO. OR FEDERAL SPEC.†
	CARBON STEELS		
AMS 5010A	Bars—Screw Stock	1112	
AMS 5022A	Bars and Forgings—1.3 Manganese, Free Cutting	1117	
AMS 5024A	Bars and Forgings—1.5 Manganese, Free Cutting	1137	
AMS 5025	Bars and Forgings—1.5 Manganese, Free Cutting—Heat Treated	1137	
AMS 5033	Wire—Low Carbon, Zinc Coated		
AMS 5036	Sheet and Strip* —Low Carbon, Aluminum Coated		
AMS 5040B	Sheet and Strip—Deep Drawing—Annealed—Cold Rolled	1010	
AMS 5042B	Sheet and Strip—Low Carbon—Cold Rolled	1010	
AMS 5044	Sheet and Strip—Low Carbon—Half Hard	1010	
AMS 5050	Tubing—Seamless—Annealed—.15 Max Carbon	1010	
AMS 5053	Tubing—Welded—Annealed—.15 Max Carbon	1010	
AMS 5060A	Bars and Forgings—.13-.18 Carbon	1015	
AMS 5070	Bars and Forgings—.18-.23 Carbon—55,000 TS	1022	AN-QQ-S-646
AMS 5075	Tubing—Seamless—55,000 TS—.22-.28 Carbon	1025	AN-WW-T-846
AMS 5077	Tubing—Welded—55,000 TS—.22-.28 Carbon	1025	AN-T-4
AMS 5080	Bars and Forgings—.32-.38 Carbon	1035	AN-S-4
AMS 5110	Music Wire—Commercial	1080	
AMS 5112A	Music Wire—Best Quality	1090	AN-QQ-W-441
AMS 5115	Wire—Spring—.65-.75 Carbon—Heat Treated	1070	QQ-W-474
AMS 5120	Sheet and Strip—Spring—.65-.75 Carbon—Annealed	1070	
AMS 5121	Sheet and Strip—Spring—.90-1.05 Carbon—Annealed	1095	AN-QQ-S-666
AMS 5122	Sheet and Strip—.90-1.05 Carbon—Hard	1095	
	CORROSION RESISTANT STEELS		
AMS 5132	Bars and Rods—.90-1.25 Carbon	1095	AN-S-5
AMS 5510B	Sheet—Pickled 18 Chromium, 8 Nickel	Heat Resistant	AN-QQ-S-757
AMS 5515A	Sheet—Pickled 18 Chromium, 8 Nickel	Deep Forming	AN-QQ-S-772 Class II Comp. G Cond. A
AMS 5516A	Sheet—Cold Rolled 18 Chromium, 8 Nickel	Annealed	AN-QQ-S-772 Class II Comp. G Cond. A
AMS 5517A	Sheet—Cold Rolled 18 Chromium, 8 Nickel	125,000 TS	AN-QQ-S-772 Class II Comp. G Cond. B
AMS 5518A	Sheet—Cold Rolled 18 Chromium, 8 Nickel	150,000 TS	AN-QQ-S-772 Class II Comp. G Cond. C
AMS 5519B	Sheet—Cold Rolled 18 Chromium, 8 Nickel	185,000 TS	AN-QQ-S-772 Class II Comp. G Cond. E
AMS 5540A	Sheet—Nickel, Chromium, Iron	Heat Resistant	AN-QQ-N-271 Cond. A
AMS 5570C	Tubing—Pickled 18 Chromium, 8 Nickel	Heat Resistant	AN-WW-T-858
AMS 5575B	Tubing, Welded—Pickled 18 Chromium, 8 Nickel	Heat Resistant	AN-WW-T-861
AMS 5580A	Tubing—Nickel, Chromium, Iron	Heat Resistant	AN-WW-T-831 Cond. A
AMS 5610A	Bars and Forgings—13 Chromium	Free Machining	
AMS 5615A	Bars and Forgings—13 Chromium, 1 Nickel, Low Carbon		
AMS 5630A	Bars and Forgings—17 Chromium, 1 Carbon		
AMS 5632	Bars and Forgings—17 Chromium, 1 Carbon	Free Machining	
AMS 5640A	Bars and Forgings—18 Chromium, 8 Nickel	Free Machining	AN-QQ-S-771 Comp. FM Cond. A
AMS 5641	Bars and Forgings—18 Chromium, 8 Nickel	Swaging	
AMS 5643B	Bars and Forgings—18 Chromium, 8 Nickel	Heat Resistant	
AMS 5665	Bars and Forgings—Nickel, Chromium, Iron		AN-QQ-N-288 Cond. A
AMS 5680	Wire—Welding—18 Chromium, 8 Nickel		
AMS 5682	Rods or Wire—Coating Alloy, Nickel, Chromium		

(*Please turn to Page 94*)



Growth Through Service

IN 1909 the capital of The Youngstown Sheet and Tube Company was increased from $6,000,000 to $10,000,000. The financial statement, read at the meeting of the Shareholders at which this action was taken, showed assets of $12,000,000. This represented an amount twenty times the original capitalization of $600,000 as of November, 1900.

$3,000,000 of this new stock was distributed to Shareholders in the form of a stock dividend. $1,000,000 was appropriated for additional expansion. In 1909-1910 there were added to the operation facilities, the third blast furnace, additional tube mills, sheet mills, and wire fabricating facilities. The ore and fuel reserves were augmented and strengthened.

The steady growth of this company had, by this time, attracted national attention. The material evolution of the plans of the men who guided the destiny of this company was the result of that type of genius which springs from hard work directed efficiently and persistently. These qualifications plus the incentive to be of greater service, and the operation of the principle of free enterprise stimulated the steady, healthy and progressive development of this great organization. These principles are as American as the Bill of Rights.

The YOUNGSTOWN SHEET AND TUBE COMPANY, Youngstown, Ohio

Manufacturers of

CARBON · ALLOY AND YOLOY STEELS

Pipe and Tubular Products · Sheets · Plates · Conduit · Bars · Tin Plate
Rods · Wire · Nails · Tie Plates and Spikes · Alloy and Yoloy Steels

AMS No.		TITLE OF SPECIFICATION		SAE No.	SIMILAR A-N AERO. OR FEDERAL SPEC.†
AMS 5683	Wire	—Nickel, Chromium, Iron			AN-N-4 Type 1 or 2
AMS 5685A	Wire—Annealed	—18 Chromium, 8 Nickel			
AMS 5688A	Wire—Spring	—18 Chromium, 8 Nickel			
AMS 5690A	Wire—Screen	—18 Chromium, 8 Nickel			AN-QQ-W-423, Cond. A
AMS 5700	Steel—Valve	—Chromium, Nickel, Tungsten			
AMS 5705	Steel—Valve	—Chromium, Nickel, Silicon			
AMS 5710	Steel—Valve	—Chromium, Silicon, Nickel			
		LOW ALLOY STEELS			
AMS 6240B	Bars and Forgings	—5 Nickel	.09-.14 Carbon	2512	
AMS 6242B	Bars and Forgings	—5 Nickel	.15-.20 Carbon	2517	
AMS 6250C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.08-.13 Carbon	3310	
AMS 6252C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.08-.12 Carbon	3310	
AMS 6253C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.11-.16 Carbon	3316	
AMS 6254C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.14-.19 Carbon	3316	
AMS 6260	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.08-.13 Carbon		
AMS 6262	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.08-.13 Carbon		
AMS 6263	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.11-.16 Carbon		
AMS 6264	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.15-.20 Carbon		
AMS 6270A	Bars and Forgings*	—.55 Ni, .5 Cr, .2 Mo	.12-.17 Carbon		
AMS 6272A	Bars and Forgings*	—.55 Ni, .5 Cr, .2 Mo	.15-.20 Carbon		
AMS 6274A	Bars and Forgings*	—.55 Ni, .5 Cr, .2 Mo	.18-.23 Carbon		AN-S-13
AMS 6280	Bars and Forgings	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		AN-S-14
AMS 6290B	Bars and Forgings	—1.8 Ni, .25 Mo	.11-.17 Carbon	4615	
AMS 6292B	Bars and Forgings	—1.8 Ni, .25 Mo	.15-.20 Carbon	4617	
AMS 6294B	Bars and Forgings	—1.8 Ni, .25 Mo	.17-.22 Carbon	4620	
AMS 6300	Bars and Forgings*	—.25 Mo	.35-.40 Carbon	4037	AN-S-9
AMS 6310A	Bars and Forgings	—1.8 Ni, .25 Mo	.33-.38 Carbon	4635	
AMS 6312A	Bars and Forgings	—1.8 Ni, .25 Mo	.38-.43 Carbon	4640	
AMS 6315A	Bars and Forgings	—1.8 Ni, .25 Mo	105,000 TS	4640	
AMS 6317A	Bars and Forgings	—1.8 Ni, .25 Mo	125,000 TS	4640	
AMS 6320A	Bars and Forgings*	—.55 Ni, .5 Cr, .25 Mo	.33-.38 Carbon		AN-S-15
AMS 6322A	Bars and Forgings*	—.55 Ni, .5 Cr, .25 Mo	.38-.43 Carbon		AN-S-16
AMS 6325A	Bars and Forgings*	—.55 Ni, .5 Cr, .25 Mo (105,000 TS)	.38-.43 Carbon		AN-S-16
AMS 6327A	Bars and Forgings*	—.55 Ni, .5 Cr, .25 Mo (125,000 TS)	.38-.43 Carbon		AN-S-16
AMS 6330A	Bars and Forgings	—1.25 Ni, .6 Cr	.33-.38 Carbon	3135	AN-QQ-S-690
AMS 6332	Bars and Forgings	—1.25 Ni, .6 Cr	.40-.45 Carbon	3140	AN-QQ-S-690
AMS 6335	Bars and Forgings	—1.25 Ni, .6 Cr	105,000 TS	3140	AN-QQ-S-690
AMS 6337	Bars and Forgings	—1.25 Ni, .6 Cr	125,000 TS	3140	AN-QQ-S-690
AMS 6350	Sheet—Annealed	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-QQ-S-685
AMS 6352A	Sheet—Annealed	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-QQ-S-686
AMS 6353	Sheet—Annealed*	—1 Cr, .2 Mo	.35-.42 Carbon	4137	
AMS 6355	Sheet—Annealed	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		AN-S-12
AMS 6357	Sheet—Annealed	—.5 Ni, .5 Cr, .25 Mo	.33-.38 Carbon		AN-S-22
AMS 6359	Plate, Sheet and Strip	—1.8 Ni, .75 Cr, .25 Mo	.35-.40 Carbon	4337	
AMS 6360A	Tubing, Seamless—Normalized	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Type I Cond. N
AMS 6361	Tubing, Seamless—125,000 TS	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Cond. HT-125
AMS 6362	Tubing, Seamless—150,000 TS	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Cond. HT-150
AMS 6363	Tubing, Seamless—180,000 TS	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Type I Cond. HT-180
AMS 6365	Tubing, Seamless—Normalized	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. N
AMS 6366	Tubing, Seamless—125,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-125
AMS 6367	Tubing, Seamless—150,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-150
AMS 6368	Tubing, Seamless—180,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-180
AMS 6369	Tubing, Seamless—200,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-200
AMS 6370A	Bars and Forgings	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-QQ-S-684
AMS 6371	Tubing, Seamless—For Machined Parts	—1 Cr, .2 Mo	.27-.33 Carbon	4130	
AMS 6380A	Bars and Forgings	—1 Cr, .2 Mo	.35-.42 Carbon	4137	AN-QQ-S-752
AMS 6381	Tubing, Seamless—For Machined Parts	—1 Cr, .20 Mo	.35-.42 Carbon	4140	
AMS 6382A	Bars and Forgings	—1 Cr, .2 Mo	.38-.43 Carbon	4140	AN-QQ-S-752
AMS 6412A	Bars and Forgings	—1.8 Ni, .75 Cr, .25 Mo	.35-.40 Carbon	4337	AN-QQ-S-756
AMS 6413	Tubing, Seamless—For Machined Parts	—1.8 Ni, .75 Cr, .25 Mo	.35-.40 Carbon	4337	
AMS 6415A	Bars and Forgings	—1.8 Ni, .75 Cr, .25 Mo	.35-.43 Carbon	4340	AN-QQ-S-756
AMS 6440	Bars and Forgings	—1.35 Chromium	.95-1.10 Carbon	52100	
AMS 6448	Bars and Forgings	—Chromium, Vanadium	.48-.53 Carbon	6150	AN-QQ-S-687
AMS 6450	Wire, Spring—Annealed	—Chromium, Vanadium	.47-.53 Carbon	6150	
AMS 6455A	Sheet, Spring—Annealed	—Chromium, Vanadium	.48-.53 Carbon	6150	
AMS 6470A	Bars and Forgings—Nitriding	—Cr, Mo, Al	.38-.43 Carbon		AN-S-19
AMS 6510	Tubing, Welded—Normalized	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-T-3
AMS 6530	Tubing, Seamless—Normalized	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		AN-T-15
AMS 6535	Tubing, Seamless—Normalized	—.5 Ni, .5 Cr, .25 Mo	.33-.38 Carbon		AN-T-22
AMS 6550	Tubing, Welded—Normalized*	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		AN-T-33

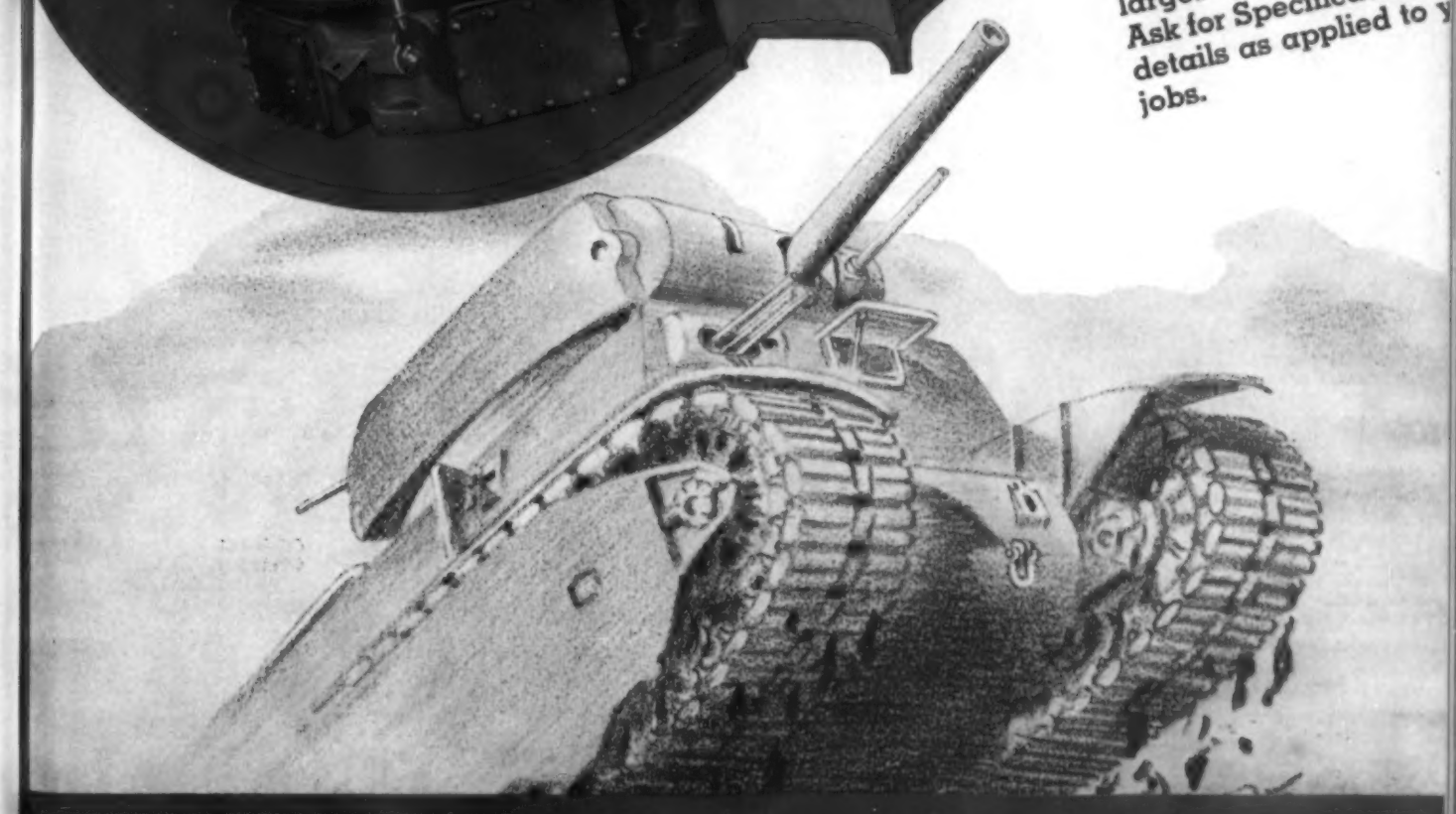
(*Please turn to Page 96*)

You Should Know—

Today hundreds of America's humming factories are beating their quotas of war weapons, by the use of Bullard Mult-Au-Matics.

These machines are not only holding the close tolerances required in all the tools of modern war, but are also setting the remarkably high rates of production. Their rigid construction assures maintained accuracy on around-the-clock running with minimum time out for maintenance.

These facts will apply to the new Type "D" 34-Inch 4-Spindle Mult-Au-Matic with six operating heads, which is now being offered for larger capacities of chucked work—crankcases, end shields, larger gear blanks, etc. Ask for Specifications or details as applied to your jobs.



THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

AMS No.		TITLE OF SPECIFICATION CARBON STEELS		SIMILAR A-N AERO. OR FEDERAL SPEC.†
		ALUMINUM ALLOYS		
AMS 4000	Sheet	—99.7% Aluminum	Annealed	
AMS 4003	Sheet	—99.0% Aluminum	2S-½ H	
AMS 4006	Sheet	—1.25% Manganese	3S-O	QQ-A-359
AMS 4008	Sheet	—1.25% Manganese	3S-½ H	QQ-A-359
AMS 4015A	Sheet	—Magnesium, Chromium	52S-O	
AMS 4016A	Sheet	—Magnesium, Chromium	52S-¼ H	
AMS 4017A	Sheet	—Magnesium, Chromium	52S-½ H	
AMS 4025	Sheet	—Magnesium, Silicon, Copper, Chromium	61S-O	
AMS 4026	Sheet	—Magnesium, Silicon, Copper, Chromium	61S-W	
AMS 4027	Sheet	—Magnesium, Silicon, Copper, Chromium	61S-T	
AMS 4035A	Sheet	—Copper, Magnesium, Manganese	24S-O	QQ-A-355
AMS 4037A	Sheet	—Copper, Magnesium, Manganese	24S-T	QQ-A-355
AMS 4040A	Sheet, Alclad	—Copper, Magnesium, Manganese	Alc 24S-O	QQ-A-362
AMS 4041A	Sheet, Alclad	—Copper, Magnesium, Manganese	Alc 24S-T	QQ-A-362
AMS 4042A	Sheet, Alclad	—Copper, Magnesium, Manganese	Alc 24S-RT	QQ-A-362
AMS 4062	Tubing	—99.0% Aluminum	2S-½ H	
AMS 4070A	Tubing	—Magnesium, Chromium	52S-O	WW-T-787
AMS 4076A	Tubing	—Magnesium, Chromium, Silicon	53S-W	
AMS 4080A	Tubing	—Magnesium, Silicon, Copper, Chromium	61S-O	
AMS 4082A	Tubing	—Magnesium, Silicon, Copper, Chromium	61S-T	
AMS 4088A	Tubing	—Copper, Magnesium, Manganese	24S-T	
AMS 4118B	Bars*	—Copper, Manganese, Magnesium	17S-T	
AMS 4120A	Bars	—Copper, Magnesium, Manganese	24S-T	
AMS 4125A	Forgings	—Silicon, Magnesium, Chromium	A51S-T	QQ-A-367
AMS 4130A	Forgings	—Copper, Silicon, Manganese	25S-T	QQ-A-367
AMS 4135A	Forgings	—Copper, Silicon, Manganese, Magnesium	14S-T	QQ-A-367
AMS 4140A	Forgings	—Copper, Nickel, Magnesium	18S-T	QQ-A-367
AMS 4145A	Forgings	—Copper, Silicon, Magnesium, Nickel	32S-T	QQ-A-367
AMS 4152A	Extrusion	—Copper, Magnesium, Manganese	24S-T	
AMS 4210B	Castings	—5% Silicon, Copper, Magnesium	Aged	
AMS 4212B	Castings	—5% Silicon, Copper, Magnesium	Solution Precipitation	AN-QQ-A-376
AMS 4214A	Castings	—5% Silicon, Copper, Magnesium	Solution and Overaged	
AMS 4217	Castings	—7% Silicon, Magnesium	Solution and Aged	AN-QQ-A-394
AMS 4220A	Castings	—Copper, Nickel, Magnesium		AN-QQ-A-379
AMS 4222	Castings	—Copper, Nickel, Magnesium	Solution and Aged	AN-QQ-A-379
AMS 4231	Castings	—4% Copper	Solution Precipitation	AN-QQ-A-390 Class II
AMS 4240A	Castings	—10% Magnesium	220-T4	AN-QQ-A-392
AMS 4280	Castings, Perm. Mold	—5% Silicon, Copper, Magnesium	Solution and Overaged	AN-QQ-A-376 Class B
AMS 4282	Castings, Perm. Mold	—4% Copper, 2% Silicon	Solution Precipitation	AN-QQ-A-383 Class B
AMS 4284	Castings, Perm. Mold	—7% Silicon	Solution and Aged	AN-QQ-A-394
AMS 4290A	Castings, Die	—12% Silicon	13	AN-QQ-A-366 Alloy 13
AMS 4292	Castings, Press. Mold	—11% Silicon	As Cast	
		MAGNESIUM ALLOYS		
AMS 4350A	Bars and Forgings	—6% Aluminum, 1% Zinc		
AMS 4360	Forgings	—8% Aluminum, .5% Zinc		
AMS 4370	Sheet	—1% Manganese	Annealed	
AMS 4380	Sheet	—6% Aluminum, 1% Zinc	Annealed	
AMS 4381	Sheet	—6% Aluminum, 1% Zinc	Hard	
AMS 4420B	Castings, Sand	—6% Aluminum, 3% Zinc	As Cast	AN-QQ-M-56, Comp. A
AMS 4422A	Castings, Sand	—6% Aluminum, 3% Zinc	Solution	AN-QQ-M-56, Comp. A
AMS 4424B	Castings, Sand	—6% Aluminum, 3% Zinc	Solution Precipitation	AN-QQ-M-56, Comp. A
AMS 4434A	Castings, Sand	—9% Aluminum, 2% Zinc	Solution Precipitation	AN-QQ-M-56, Comp. C
AMS 4490A	Castings, Die	—9% Aluminum, .7% Zinc	As Cast	
		COPPER ALLOYS		
AMS 4500	Sheet	—Copper	Annealed	QQ-C-501
AMS 4505A	Sheet	—Brass	Annealed	QQ-B-611
AMS 4510A	Strip	—Phosphor Bronze	Spring	QQ-B-746
AMS 4520A	Strip	—Bronze, 4% Tin, 4% Zinc, 4% Lead	Bushings	
AMS 4553	Tubing	—Brass	Light Annealed	
AMS 4610A	Rod or Bar	—Free Cutting Brass	½ Hard	QQ-B-611
AMS 4611	Rods and Bars	—Naval Brass	Half Hard	QQ-B-636
AMS 4612	Rods and Bars	—Naval Brass	Hard	AN-QQ-B-646
AMS 4614B	Forgings	—Brass		QQ-B-611
AMS 4615	Rods and Bars*	—Silicon Bronze	Hard	
AMS 4619	Forgings	—Manganese Bronze		QQ-B-721
AMS 4625B	Rods and Bars	—Phosphor Bronze	Hard	QQ-B-746
AMS 4630A	Bars and Forgings	—Aluminum Bronze, 9% Aluminum		QQ-B-666, Grade B
AMS 4632	Rods and Bars	—Aluminum Bronze, 9% Aluminum	Hard	QQ-B-666, Grade B
AMS 4635	Bars and Forgings	—Aluminum Bronze, 10% Aluminum	Hard	
AMS 4640	Bars and Forgings	—Aluminum Bronze, 10% Al, 5% Ni, 3% Fe	Heat Treated	
AMS 4650A	Bars and Forgings	—Beryllium Bronze, 2% Beryllium	Solution	
AMS 4665	Tubing	—Silicon Bronze	Annealed	
AMS 4710	Wire, Tie	—Brass	Tinned	
AMS 4720A	Wire	—Phosphor Bronze	Spring	
AMS 4750	Solder	—Tin Lead, 50-50		
AMS 4755	Solder	—Lead Silver, 95-5		
AMS 4770	Brazing Alloy	—Silver, 50% Silver, Copper, Zinc, Cadmium		
AMS 4800	Bearings	—Babbitt		
AMS 4805	Bearings	—Sintered—Bushings		AN-B-7

(*please turn to page 99*)

BETTER CARTRIDGE CASES...FASTER VIA THE "HOT-CUP"

ONE EVERY 20 SECONDS! Steel slugs are dropped into top of TOCCO inductor which holds 12 slugs. A bottom slug, heated to required temperature, is ejected every 20 seconds—180 per hour.

The 25-year battle to convert cartridge cases from brass to steel has been won, saving critical copper and providing cases that can be reloaded many times.

One successful method of mass production of steel cases is by the "hot-cup" process. For 75 m.m. cases, steel slugs are TOCCO-heated to required temperature, extruded to a depth of 4", then redrawn while still hot to 6" depth. Subsequent stages in forming are by cold-drawing.

Reasons for using TOCCO induction heating for these operations:

TOCCO raises steel slugs to forging temperature so rapidly that scale is practically eliminated, saving wear on dies. Output of each TOCCO machine is 180 white-hot slugs per hour.

TOCCO heats the slugs uniformly for accurate forming and minimum scrap losses, helping overcome the major obstacle in use of steel for cartridge cases.

TOCCO heats the slugs at a rate to suit the forming operations. If a press delay occurs, no large furnace batches are lost.

TOCCO machine, clean, compact and devoid of radiant heat and hot gases, is located handily next to presses for faster production with good working conditions.

Why not look into the possibilities of TOCCO for improving *your* production for hot forming and forging.

THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio

TOCCO

World's Fastest, Most Accurate Heat-Treating Process

HARDENING
ANNEALING
BRAZING
HEATING for
forming and forging

Rx FOR VICTORY

SCRAP SCRAP MORE SCRAP

Ninety million tons of steel in 1943. That's what the doctor ordered to hasten the Axis demise. But to produce 90 million tons the mills must have 45 million tons of scrap metal. Regular sources of supply account for only half that amount. The remaining tonnage must come from scrap metal now lying around factories, garages, homes, farms.

How quickly we terminate this war depends on our ability to outproduce our enemies. And, according to no less an authority than Donald M. Nelson, "Nothing is more important to war production than scrap." Any relaxation in salvaging scrap would sabotage our entire war effort. Do your part in filling the victory prescription.

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY

DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

AMS STEELS—*Continued*

AMS No.		TITLE OF SPECIFICATION		SIMILAR A-N AERO. OR FEDERAL SPEC.†
AMS 4815	Bearings	—Silver, Electrolytically Deposited	Steel Back	
AMS 4817	Bearings	—Silver, Cast	Steel Back	
AMS 4820	Bearings	—Copper, Lead, 73-27	Steel Back	
AMS 4822	Bearings	—Copper, Lead, Tin, 71-25-3	Steel Back	
AMS 4825	Bearings	—Copper, Lead, Tin, 74-16-10	Steel Back	
AMS 4827	Bushings	—Copper, Lead, Tin, 80-10-10	Steel Back	
AMS 4840	Castings	—Bronze, 70% Copper, 25% Lead, 5% Tin		
AMS 4842	Castings	—Bronze, 80% Copper, 10% Lead, 10% Tin		
AMS 4845A	Castings	—Bronze, 88% Copper, 10% Tin, 2% Zinc		
AMS 4860	Castings	—Manganese Bronze		QQ-B-726
AMS 4862	Castings	—Manganese Bronze—High Strength		
AMS 4871	Castings	—Aluminum Bronze—Heat Treated		AN-QQ-B-672

*Indicates New and Revised Specifications issued April 1, 1943. (Revisions are marked with an "A" or "B", etc. following the specification number.)

†Please note the concluding paragraph of each specification re SIMILAR SPECIFICATIONS. In cases where the use of a similar specification is proposed the user and the supplier shall determine, on the basis of the facts of the individual case, whether the proposed A-N, or other specification, is considered an acceptable alternate. The basic number of the similar specification is listed. However, the issue in effect at the date of invitation for bids or inquiry applies.

"Planned" Lubrication

(*Continued from Page* 83)

card, indicating that all the spindles of that type have been serviced.

As to the frequency of lubricating the slides, this operation was stepped up. This prevented the grit from accumulating by the washing out process of the lubricant. No more headaches on this score.

Many problems have since been solved by simply stepping up or decreasing the frequency of lubrication. The next step was to set up a definite schedule. This was determined after careful study of each category of lubrication.

Uniform Film Prevents "Floating"

By changing the oil in the No. 5 surface grinder spindle reservoirs at more frequent intervals, lubrication failures were eliminated. Likewise, with this success as a basis, all other spindles were changed more frequently. In damp weather, the frequency is increased to overcome any moisture drawn into and condensed in the machine due to the machine's cooling off when shut down.

In considering the frequency of lubrication, it was kept in mind that a uniform film of lubrication was to be maintained to aid in keeping tolerances and preventing "floating", especially on grinding machines doing super finish work. It was found that the lack of proper frequency of lubrication caused the slides to vary as much as 0.001-inch.

A visible filing system, Fig. 1, brings to the clerk's attention all jobs occurring at less than two-week intervals. These are listed daily on work orders and are given to the supervisors for further handling. When the work is completed, the checked work order is returned to the office and the next service date is recorded on the visible file.

"Say, Bill, did Joe grease this machine this morning? The operator said he missed his machine altogether."

"He's nuts; Joe never misses a machine."

And so the argument started. The question of whether or not a machine was lubricated was solved by the development of a daily record card, Fig. 2. This card is punched in the square provided every time one of the categories of lubrication is performed. When a date is required, as in the cast of a motor being greased, a reservoir changed, etc. a *lead* pencil is used by the first shift, a *blue* by the second and a *red* by the third. This card also bears the name and type of machine, machine number and the number of each lubrication man who may service the machine. The permanent and daily record cards give an accurate and full account of the machine and all lubrication performed on it.

In several instances, where it was a question of whether or not the proper lubricants were used, and whether or not the machine was oiled at the proper interval, the manufacturer, without question, accepted the veracity of the records and made full adjustments for any repairs required.

Apply Changes Universally

It is a known rule of the lubrication department that any falsification of records by anyone means instant dismissal. This service is also checked by the operator of the machine.

Whenever any improvement or adjustment is made on one machine, immediately the change is made on all similar types throughout the entire plant. Just recently, in one of the new machines that had been in operation for about a month, it was found that the wicks in the spindle were not sufficient in number to supply enough lubrication and would eventually cause the spindles to stick. All of the new machines of the same make and type were checked and when this condition was found to be prevalent, two wicks were inserted instead of the one formerly used. This improvement will undoubtedly pay big dividends in uninterrupted production.

Lubrication Time Study

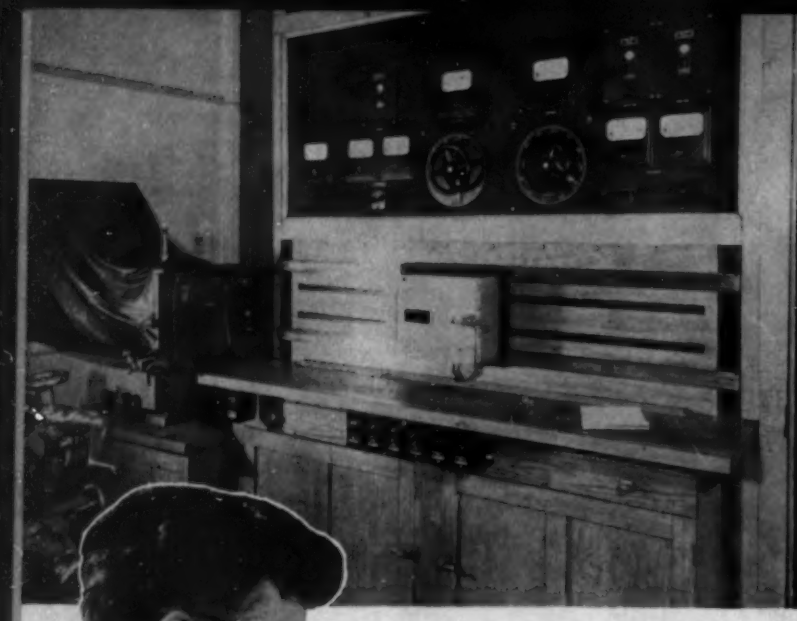
A great step forward was made when a time study was taken of the various categories of lubrication performed in servicing the 450 or more different types of machines and equipment. These categories include such operations as adjusting and filling spindle cups, motor greasing, reservoir changes, general greasing, hand oiling, etc. In order to arrive at a fair average timing, at least 300 operations of a kind were timed. The walking time between machines, time consumed in replenishing stock of oil, punching the card and delayed action were all timed and taken into consideration.

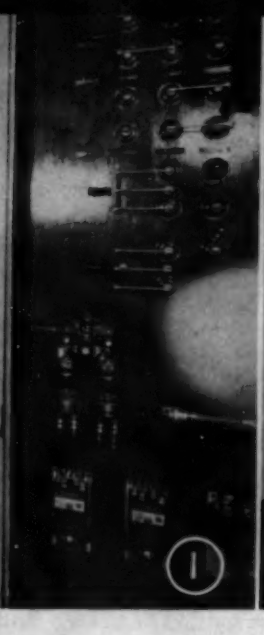
Although this timing seemed endless, it was well worth the effort. The time study showed exactly how many lubrication servicemen were needed in order to allow sufficient time for the work to be done properly without neglecting any machine. It also showed that time was saved if the lubrication personnel specialized in one phase of lubrication. This meant that only one or two oils are used by any individual instead of six or seven, so that again the possibility of error is reduced. This also allows the personnel to develop a high degree of efficiency in their line.

The time study made it possible to set up standards and to pay a bonus accordingly. The daily record card serves as the basis for the bonus and is removed and checked every two weeks.

The daily record card and the time study also makes it possible to establish the cost of the lubrication of any one machine, group of machines, or total number of machines operated in plant.

(*Please turn to Page* 130)





SPECTROGRAPHIC

By P. R. IRISH
Development and Research Department
Bethlehem Steel Co.
Bethlehem, Pa.

ONE OF the many factors governing the time required for completing a heat of steel is the speed with which tests and analyses can be made during the refining period.

The quicker tests and analyses can be completed, the shorter the heat time, and the greater the output per furnace.

To speed up the analytical control in the production of alloy steels, thereby increasing the output of vital war materials, Bethlehem Steel Co. recently installed a spectrographic laboratory at its

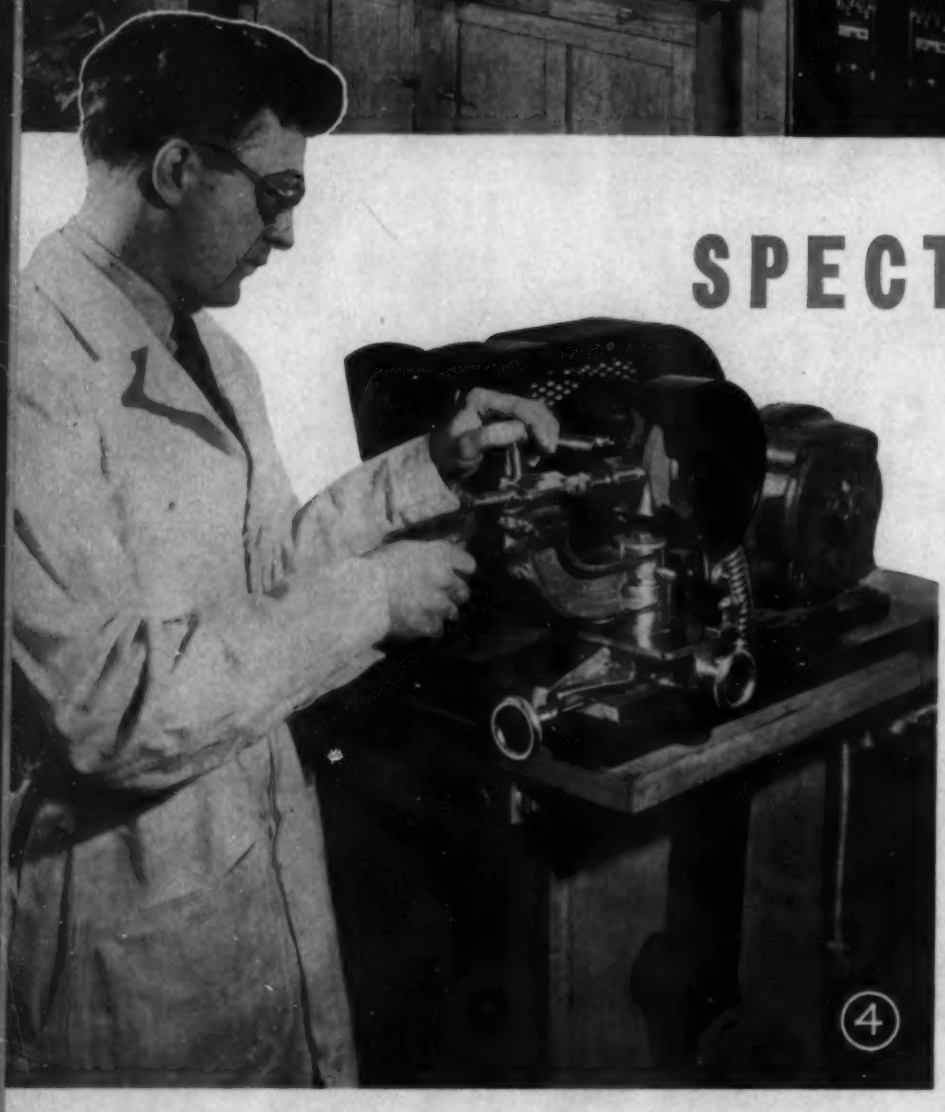
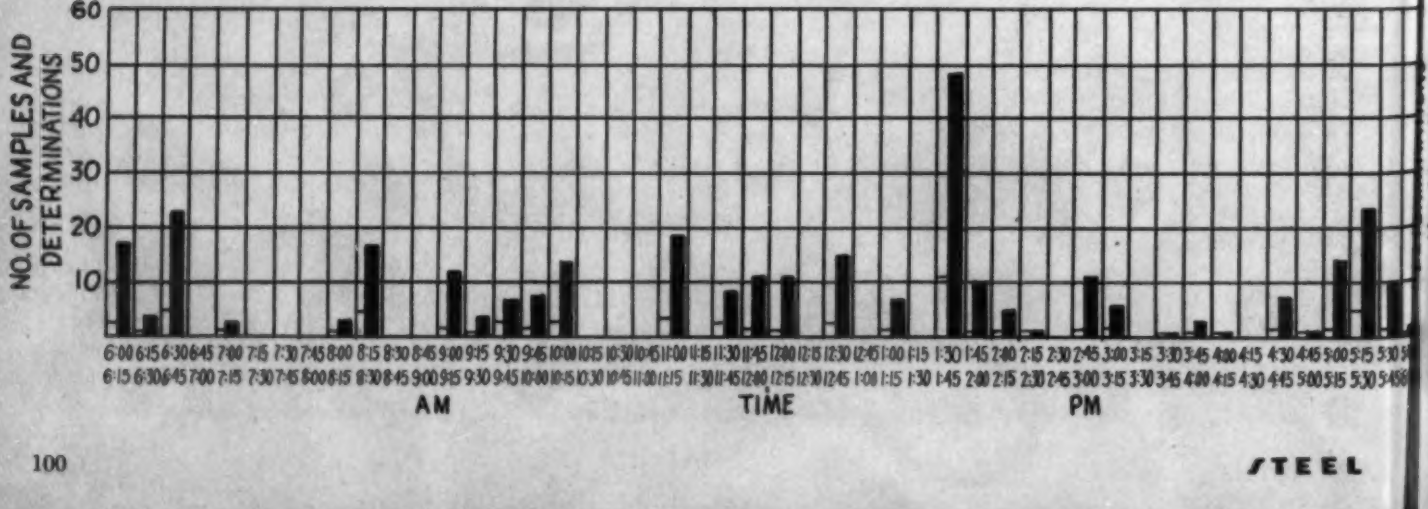
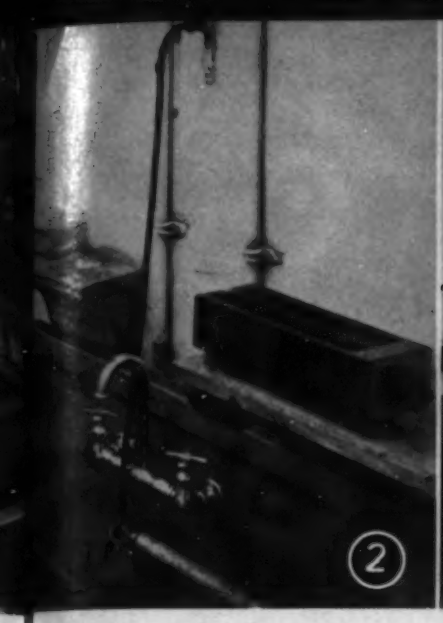


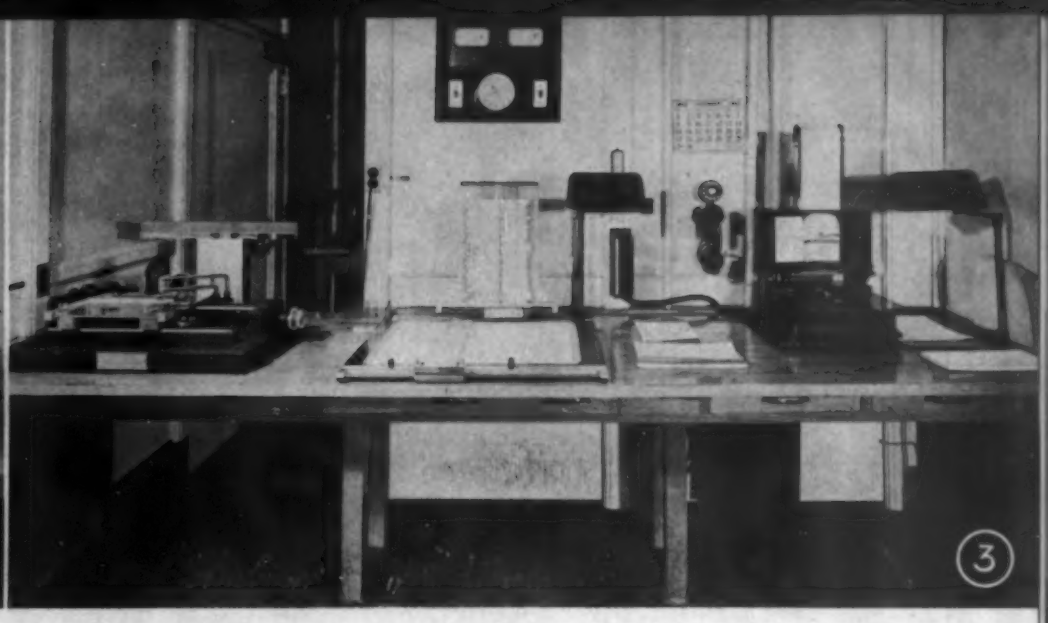
Fig. 1—Excitation source equipment

Fig. 2—One corner of the dark room

Fig. 4—Grinder used in preparing test specimens







NALYSIS OF ALLOY STEEL

plant at Bethlehem, Pa. The unit, which has been in operation for more than a year, is meeting all expectations both in regard to accuracy and speed.

The laboratory furnishes the control and final heat analyses for 15 melting units, all producing alloy steels. Except for carbon, sulphur, phosphorus, and certain ranges of other elements discussed in the final paragraphs of this article all constituents are analyzed spectrographically.

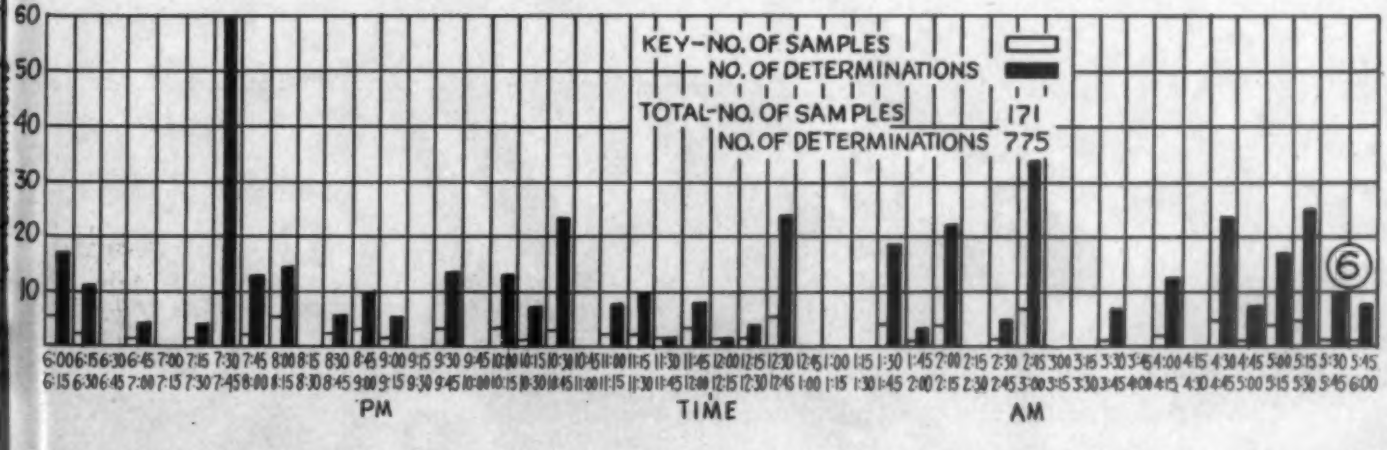
The spectrographic laboratory at Bethlehem, to the best of our knowledge, represents the most extensive application of spectrographic analysis to a direct production control problem, and it is the first installation applying such control to alloy steels. Over 5000 determinations are made each week. A force of five men is employed on each shift to make sure that all determinations are carried out with the greatest possible speed. The analyses are made on steels having narrow specification limits with a large percentage of the concentrations falling in the higher alloy ranges, from 1.00 to 5.00 per cent.

The floor plan of the spectrographic laboratory is shown in Fig. 7. Fig. 1 gives a general view of the excitation source equipment, which consists of a high-voltage interrupted-spark circuit and a high-voltage alternating current arc circuit. The interrupted-spark circuit has a top voltage rating of about 42,000 volts and a maximum condenser capacity of 0.02-microfarad adjustable in steps of 0.002-microfarad. The alternating current circuit is capable of delivering a peak current of 2.5 amperes at 4800 volts,

Fig. 3—Spectrum reading room. Microphotometer at left; telautograph at right

Fig. 5—Typical examples of arc and spark spectrum

Fig. 6—Charts showing number of samples and determinations in an average day's operation



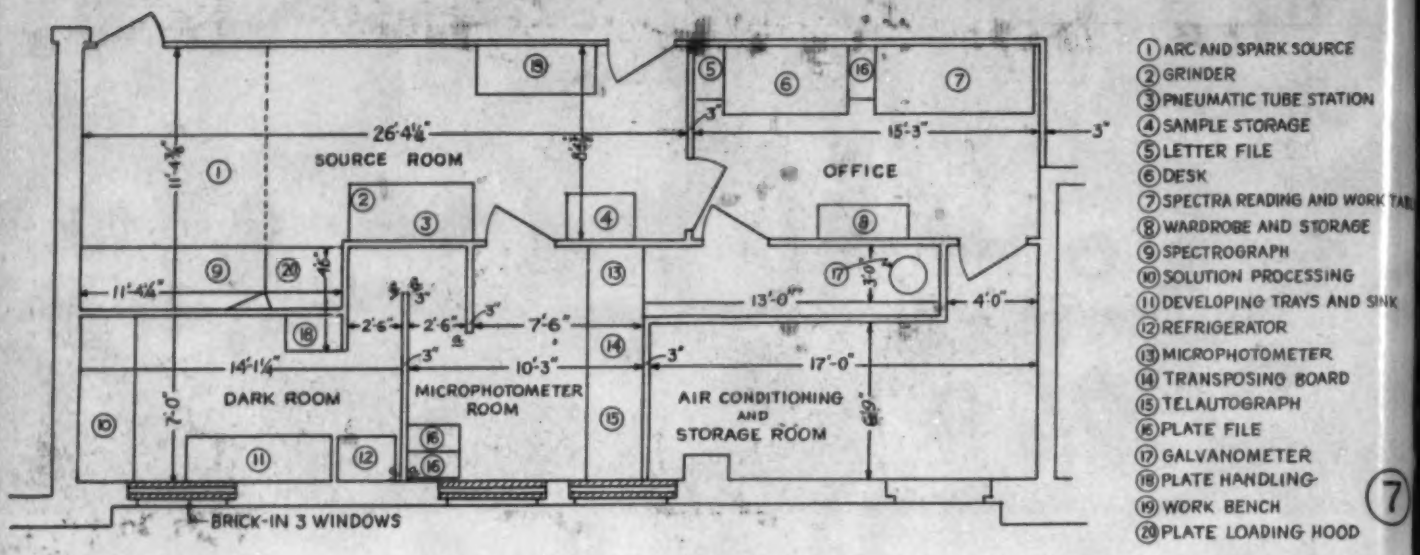
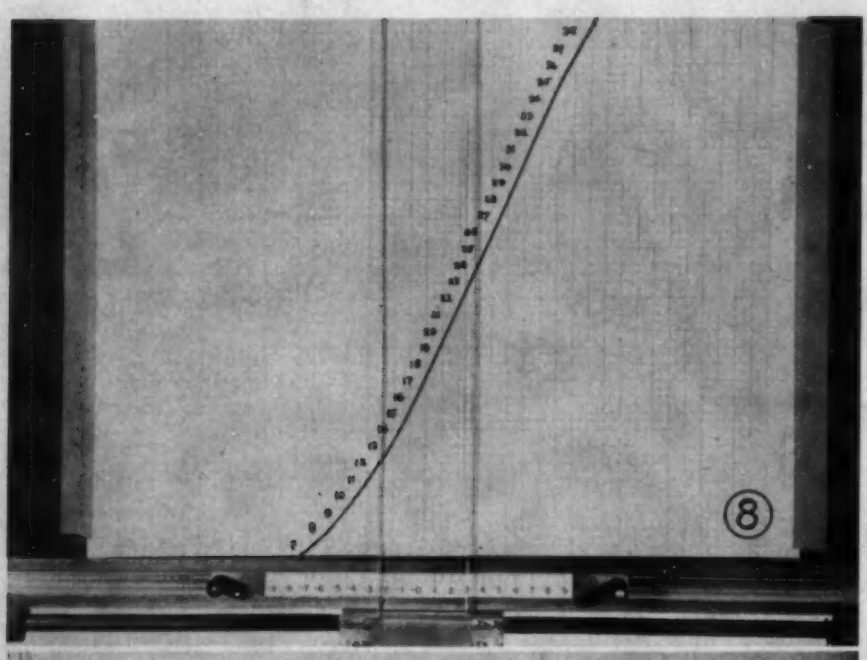


Fig. 7—General floor plan of spectrographic laboratory

Fig. 8—Close-up of calculating board

Fig. 9—Close-up of microphotometer



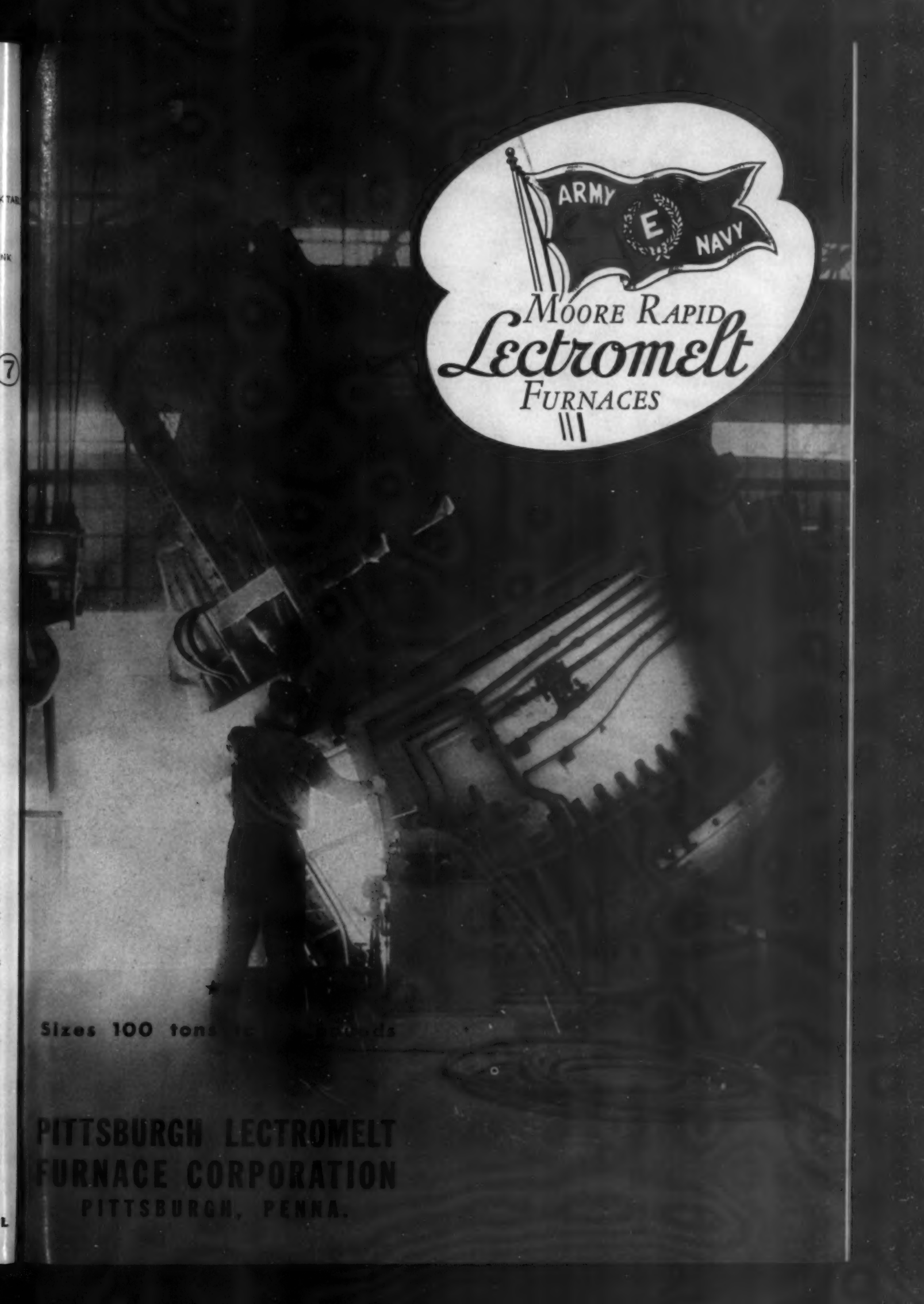
and 5 amperes at 2400 volts. As shown in the illustration, all controls and meters are arranged in a convenient, compact assembly, permitting maximum ease in the operation of the instrument. Spectrum exposures are timed automatically, with one timer for each source of excitation and one for the shutter of the spectrograph. All doors leading to the high-voltage room are equipped with trap switches to protect the operator.

Photographs of the spectra of the electrical discharge are taken with a standard Bausch & Lomb large Littrow spectrograph. A solenoid attachment to the shutter lever provides electrical control of the shutter mechanism. Mounted in front of the slit is a lens holder, making it possible to rotate any one of three lenses into position. A split neutral filter also is mounted in front of the slit. The plate holder of the instrument is covered with a leather hood which extends to an opening in the wall leading to the darkroom. This makes it possible to insert a plate in the instrument from the darkroom without removing the plate holder.

A general view of the darkroom is

TABLE I—Elements Determined Spectographically with Ranges Covered

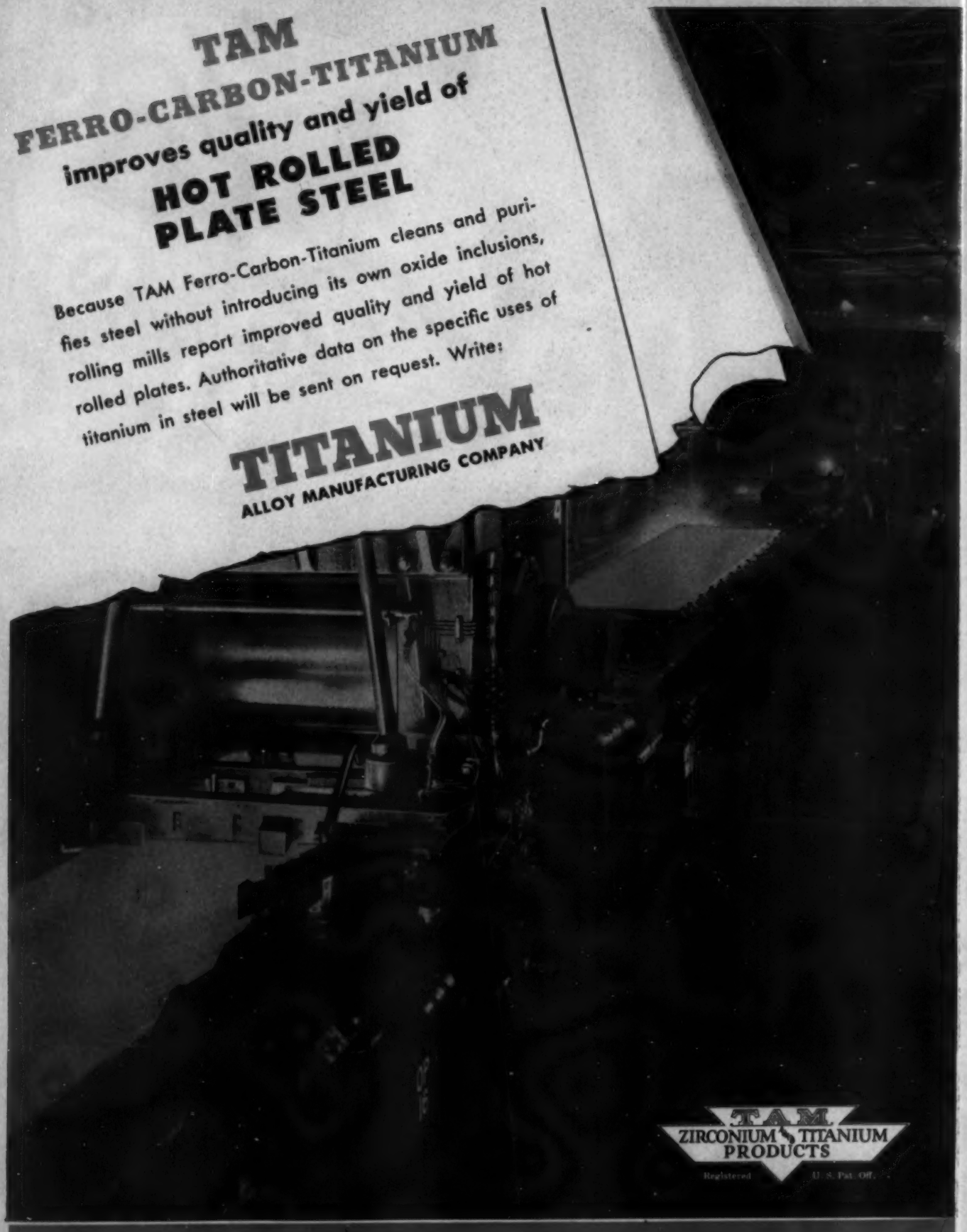
Element	Range, per cent
Manganese	0.05 -1.00
Silicon	0.002-0.70
Nickel	0.01 -3.50
Chromium	0.03 -2.00
Vanadium	0.005-1.50
Molybdenum	0.002-6.50
Copper	0.04 -0.50
Tungsten	0.25 -1.00
Aluminum	0.004-2.00
Titanium	0.01 -0.07
Tin	0.003-0.10
Boron	0.001-0.01


ARMY
E
NAVY
MOORE RAPID
Lectromelt
FURNACES
Sizes 100 ton
PITTSBURGH LECTROMELT
FURNACE CORPORATION
PITTSBURGH, PENNA.

TAM
FERRO-CARBON-TITANIUM
improves quality and yield of
HOT ROLLED PLATE STEEL

Because TAM Ferro-Carbon-Titanium cleans and purifies steel without introducing its own oxide inclusions, rolling mills report improved quality and yield of hot rolled plates. Authoritative data on the specific uses of titanium in steel will be sent on request. Write:

TITANIUM
ALLOY MANUFACTURING COMPANY



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ZIRCONIUM & TITANIUM PRODUCTS
Registered U. S. Pat. Off.

GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma
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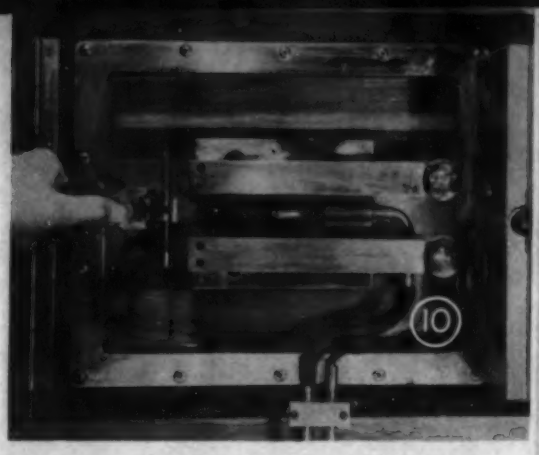


Fig. 10 — Close-up of electrode clamps

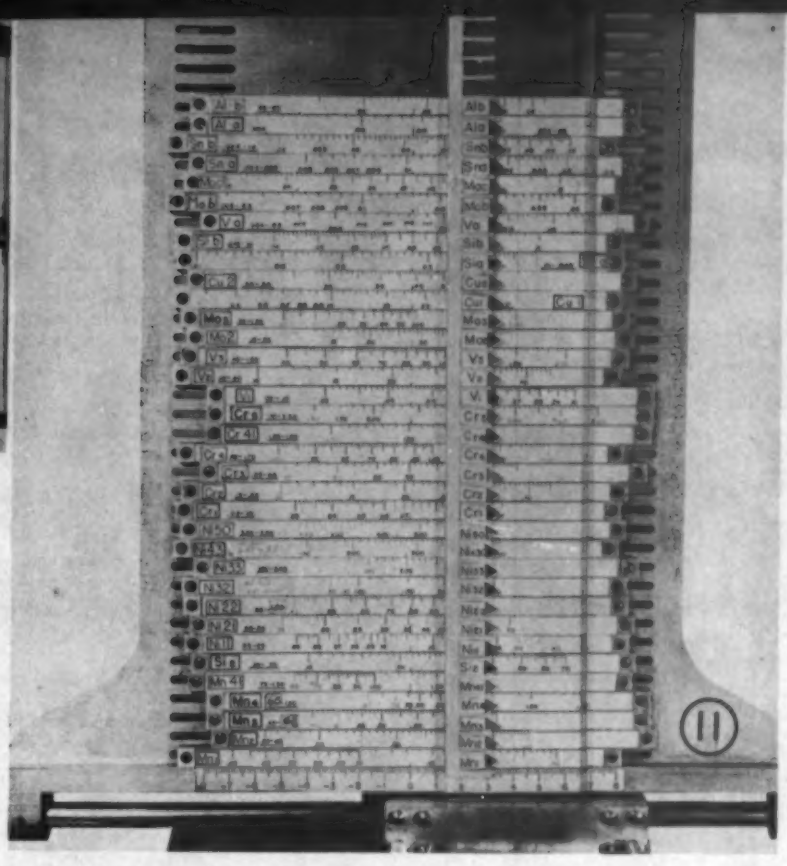


Fig. 11—Close-up of scale board

presented in Fig. 2. The plates are developed in the machine shown at the left. This machine is equipped with automatic temperature control and with two-directional agitators which operate out of step with each other and which have different oscillating periods. This imparts a turbulence to the solutions which is impossible to attain with any set wave pattern or direction as produced in the rocker-type agitator generally used for developing spectrographic plates. About 3 to 4 minutes normally is required in processing a plate.

The spectrum reading room is pictured in Fig. 3. Here the microphotometer is at the left, the calculating board and the scale board in the center, and the telautograph at the right. The microphotometer, which is shown in close-up in Fig. 9, was built by the University of Michigan, Ann Arbor, Mich. One of the important features of the instrument is its ease of operation. Once a plate has been placed in the instrument the operator can make all readings with little shifting of position.

While reading, he has his left hand placed on the front left hand corner of the plate carriage. With this hand he can move the main carriage rapidly along, shifting any portion of the spectrum on the screen. At the same time his left hand is in position for shifting any one of the spectra on the screen by moving the cross carriage. The operator's right arm rests on the table with the hand extending back to the large reading knob. To align the microphotometer slit with the spectral lines, the operator has only to move his right hand to the small knob in front of the driving knob. An image of the unknown spectrum is projected on the viewing screen with a master spectrum below. This screen and the density scale are so arranged that practically no adjustment in the accommodation of the eye is required when the gaze of the operator is shifted from the one to the other.

(*Please turn to Page 127*)

TABLE II—Spectral Lines Employed for Various Elements with Ranges, Source and Filter

Element Line	Iron Line	Range Per Cent	Source	Filter
Mn 2933.06	Fe 2931.60	0.05 -0.20	Spark	
Mn 2933.06	Fe 2936.91	0.20 -0.45	Spark	F
Mn 2933.06	Fe 2897.26	0.45 -0.65	Spark	F
Mn 2558.59	Fe 2553.73	0.65 -1.00	Spark	F
Si 2881.58	Fe 2885.35	0.002-0.015	Arc	
Si 2881.58	Fe 2886.32	0.015-0.06	Arc	
Si 2881.58	Fe 2875.30	0.06 -0.10	Arc	F
Si 2881.58	Fe 2874.17	0.10 -0.70	Spark	
Ni 3414.77	Fe 3431.81	0.01 -0.05	Arc	
Ni 2316.04	Fe 2318.35	0.05 -0.25	Spark	
Ni 2316.04	Fe 2322.33	0.20 -0.50	Spark	F
Ni 2303.00	Fe 2307.31	0.50 -1.00	Spark	F
Ni 2300.09	Fe 2294.61	1.00 -1.60	Spark	
Ni 2302.47	Fe 2303.35	1.60 -2.40	Spark	
Ni 2302.47	Fe 2304.73	2.40 -3.50	Spark	F
Cr 2677.16	Fe 2676.88	0.03 -0.12	Spark	
Cr 2677.16	Fe 2682.52	0.12 -0.25	Spark	F
Cr 2677.16	Fe 2642.02	0.25 -0.45	Spark	F
Cr 2862.57	Fe 2876.80	0.45 -1.20	Spark	F
Cr 2818.36	Fe 2837.29	1.20 -2.00	Spark	
V 3185.40	Fe 3207.09	0.005-0.02	Arc	
V 3110.71	Fe 3106.56	0.02 -0.10	Spark	
V 3110.71	Fe 3075.72	0.10 -0.40	Spark	F
V 3130.27	Fe 3075.72	0.40 -1.50	Spark	F
V 3063.25	Fe 3062.23	0.40 -1.50	Spark	F
Mo 3170.35	Fe 3207.09	0.002-0.008	Arc	
Mo 3170.35	Fe 3196.13	0.008-0.03	Arc	F
Mo 2816.15	Fe 2815.51	0.03 -0.15	Arc	
Mo 2775.40	Fe 2776.18	0.15 -0.55	Spark	
Mo 2775.40	Fe 2770.51	0.55 -2.00	Spark	F
Mo 2644.35	Fe 2682.52	2.00 -3.50	Spark	F
Mo 2644.35	Fe 2649.46	3.50 -6.50	Spark	F
Cu 3273.96	Fe 3277.35	0.04 -0.20	Spark	
Cu 3273.96	Fe 3286.76	0.20 -0.50	Spark	F
Sn 3175.02	Fe 3157.04	0.003-0.01	Arc	
Sn 3034.12	Fe 3012.45	0.01 -0.03	Arc	
Sn 2839.99	Fe 2848.72	0.03 -0.10	Arc	F
Al 3082.16	Fe 3080.11	0.004-0.02	Arc	
Al 3082.16	Fe 3078.43	0.02 -0.05	Arc	F
Al 3082.16	Fe 3053.44	0.05 -0.12	Arc	F
Al 3082.16	Fe 3075.72	0.80 -2.00	Spark	
W 2656.54	Fe 2651.71	0.25 -0.50	Arc	
W 2656.54	Fe 2656.15	0.50 -1.00	Arc	
Ti 3371.45	Fe 3389.75	0.01 -0.04	Arc	
Ti 3371.45	Fe 3387.41	0.04 -0.07	Arc	F
B 2496.78	Fe 2505.01	0.001-0.008	Arc	
B 2496.78	Fe 2496.99	0.008-0.02	Arc	F

ELECTROSTATIC "DETEARING"

. . . . helps control "drain-off" when baking the finish on dipped steel cartridge cases; triples output, cuts man-hours two-thirds, produces superior product

By HAROLD P. RANSBURG
Harper J. Ransburg Co.
Indianapolis, Ind.

MANY CHANGES have taken place in the art of industrial finishing. The dip process has long been handicapped by difficulties experienced at "drain-off" points. Experience has indicated that no matter how efficient an oven is, the final finish is not always that desired because of the difficulty of uniformly removing this excess material before the baking process begins.

Therefore the electrostatic "detearing" process is important because it is being applied successfully on many important war jobs where it has resulted in a satisfactory baked finish being produced.

The several advantages of applying liquid coatings by the dip method are well known. Persons baking such dipped coatings in ovens are also quite aware of the difficulties and limitations of orthodox dipping practices.

Probably the most serious difficulty encountered has been the ever-present accumulation of excess material at "drain-off" points on the work. A happy solution to this problem has long evaded finishing engineers. We have tried to use capillary attraction by the slow pull-out method, centrifugal force, swabbing, cutting off, patching, etc. Expedients such as these, though having merit in certain cases, never were widely accepted because they either failed to satisfactorily remove the excess or they involved other complications of some considerable proportions.

It is the purpose here to describe a new method of eliminating this problem, and in particular to analyze some of its effects on bake oven design and to show how it is proving valuable in facilitating production of steel cartridge cases for our armed forces.

Electrostatic "detearing" applied to the steel cartridge case industry constitutes a very definite contribution toward solving the baking problem. In this instance we are dealing with a part which has a thickness of about ⅜-inch at the head while it is only 0.040-inch thick at the mouth. Heating engineers state that in order to obtain a uniform bake, 80 per cent of the heat required for the whole cartridge case is needed for the heavy end. In spraying, it is necessary to rotate the case while it is supported by a rod inserted in the primer hole. The rod obviously conducts heat away from the head. This condition is further aggravated where the floor of the oven is slotted to permit the rod to move through the slot. Unless the baking oven is kept under substantial pressure, this slot permits the entrance of cold air at the point where 80 per cent of the heat is required. Another difficulty is that the supporting rod closes the primer hole and precludes the possibility of proper ventilation inside the shell.

By the "detearing" method, the shell is hung on a simple springclip in the primer hole, permitting very little conduction of heat from the work and readily lending itself to ample ventilation during the baking operation. The required coating material is claimed to be so heat-critical that the difference between the lower limits, where the coating is still fusible, and the upper limits, where the material becomes excessively brittle, is a period of only 3 or 4 minutes at 350 degrees Fahr.

In the operation of this process, the work is dipped in any suitable manner, then it proceeds along a conveyor over a drainboard, and is permitted to "air dry" or "set" sufficiently so that the coating material has practically ceased flowing. At this stage the sections from which the paint has been dripping, which we call "drain-off points," are subjected to a powerful electrostatic field which is designed to set up an attractive force between the grounded article and a high voltage electrode which is properly spaced from the object.

The interval of time between leaving the dip-tank and entering the electric field is not highly critical. The proper timing is dependent on the size and shape of the article, the flowing characteristics of the coating material, and the evaporation rate of the solvents in the coating material. In general, it can be said that this interval of time will be between 1 and 4 minutes.

The electrodes are designed for the particular application involved, giving consideration to the speed of conveyor and type of article being treated. It is essential that each drain-off point, from which excess material is to be removed, be exposed directly to the high voltage plates. Any portion of the article which is electrically shielded from the field is less effective directly in proportion to the extent to which it is shielded. The electrodes themselves are preferably of flat metal plate or other material which will present a relatively continuous electrical conducting medium.

Conditions such as the length of electrodes, as well as the distance between the electrodes and the grounded work pieces, depend largely upon the radius of the surface at the point from which the excess material is being removed. The smaller the radius, the more responsive the reaction will be. Thus with smaller radii, it is necessary to use a greater distance between the article and the electrode, and a shorter length of time is required for removing the proper amount of excess material. The length of time required for "detearing" a given article will almost invariably be between 15 seconds and 1 minute. This period of time depends not only upon the radius involved but also upon the conductivity of the item itself, as well as the condition (flowability) of the coating material at the time of treatment.

The electric field is energized by a specially designed power pack which produces a half-wave direct-current voltage of considerable magnitude but low power. This unit is so designed that on a dead short it will not produce a current of more than 5 milliamperes. In a normal application it will operate at a value in the neighborhood of 200 microamperes at 85,000 volts. It is a self-contained, oil-immersed unit, with no moving parts. It requires a primary power source of 220 volts, 60 cycles, drawing approximately 3 amperes.

There are quite broad tolerances on the normal application if certain factors are properly correlated, such as the length of time between the tank and electrodes, the evaporation rate of the solvents, the flowing characteristics of the coating material, the shape and size of the article, the distance between the electrode and the article, the radius of the "drain-off" point, and the length of time the article is under treatment.

Though it may appear from this discussion that there are a number of complicated ramifications, the process is quite simple to operate and highly flexible in

(*Please turn to Page* 131)

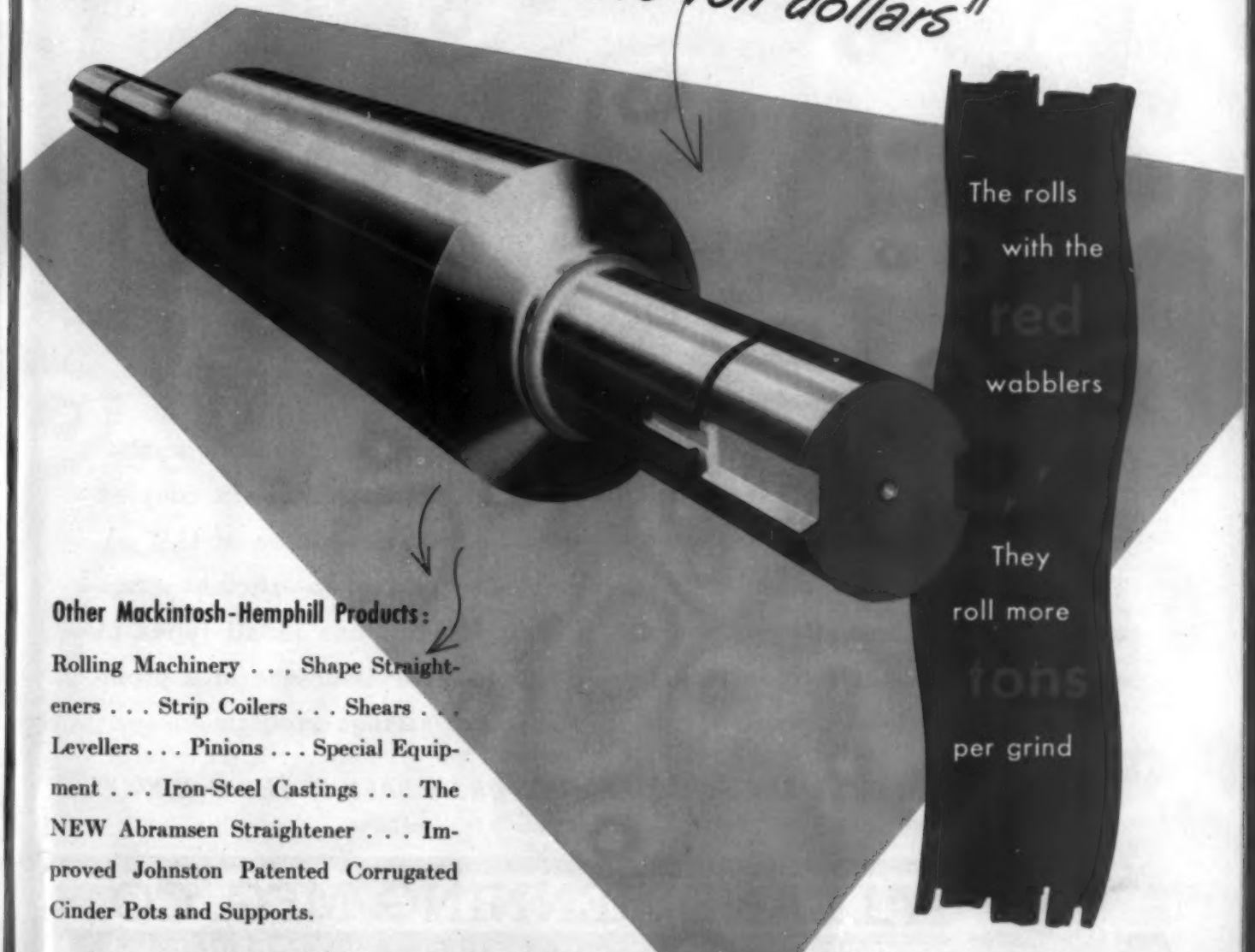
From a paper presented at American Gas Association's War Conference, Detroit, March 11 and 12, 1943.

Ol' Red Wabbler says:

"Nironite D Work Rolls in 4-high single stand and tandem cold mills *give better finish . . . save roll dollars*"

M-H Nironite D Work Rolls for 4-high single stand and tandem cold mills have attained their greatest success in replacing forged and hardened alloy steel rolls, because they have greater resistance to indentation. This means better surface finish for the cold rolled product and a reduction in cost, because M-H Nironite D Rolls stay in the stands longer between roll grinds. These rolls also have a greater hardness penetration and thus can be used down to scrap diameter without being rehardened.

You can get better surface finishes and save roll dollars at the same time. Specify M-H Nironite D Work Rolls for single and tandem cold mills.



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Get in the SCRAP for VICTORY
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This installation shows a Model MCY Baler, one of several G-H Hydraulic Balers operating in various Westinghouse plants.

In a leading body plant now devoted to War Production, a conveyor system carries baled metal scrap from the G-H Baler direct to freight cars.

The handling and baling of metal scrap varies in every metal working plant, depends upon the type and volume of scrap produced and the ease with which it may be routed to the baler. The capacity of the baler must be equal to peak requirements. Its power and efficiency must result in bales of maximum density at lowest possible cost.

The efficiency, capacity and durability of G-H Hydraulic Balers, coupled with the vast experience of G-H engineers in setting up efficient scrap-baling installations in all types of plants, is your assurance of a profitable scrap salvage program.

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Metal Washer

American Foundry Equipment Co., 535 South Byrkit street, Mishawaka, Ind., recently developed a Tabl-Spray metal washing machine for washing flat, fragile work or circular parts with intricate pockets and crevices. It is reported to insure uniform coverage and thorough speed cleaning of parts.

Parts to be cleaned are placed on the mesh table of the machine and rotated through the spray solution, discharged from special non-clogging nozzles.

Following the required washing time, the solution valve is closed, and parts are left rotating to obtain proper drainage. Rinsing with fresh water also can be handled without transferring parts to another compartment by means of an arrangement of drainplates.

A system of straining devices placed in the path of the recirculated cleaning so-

lution settles all chips or foreign matter. The spray system is removable and is fully accessible for adjustment.

Parts measuring 25 inches in diameter and 12 inches high can be handled on the standard machine. Machines with 30 and 42-inch diameter tables for larger size work are available.

Binder Bar Slot Miller

Snyder Tool & Engineering Co., Detroit, recently developed a new automatic machine for milling binder bar slots in aircraft cylinder heads. The slots are angularly arranged on three fin sections and all three are cut at one time. With the part located on a master locating plate and clamped on the fixture table, the tools advance into the work and feed to the full depth of 3/16-inch. When the full depth is reached, the table automatically moves lengthwise and feeds the work against the tools for the entire length of the cut. At the end of this lengthwise cut, the tools automatically retract, completing the cycle.

The finished part is replaced by another, clamped in exactly the same position from which the finished part was removed. The cycle is repeated with the

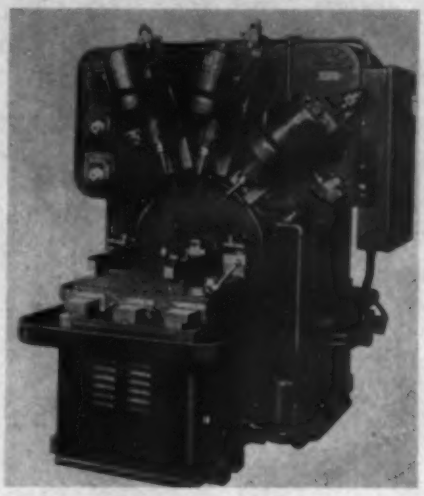


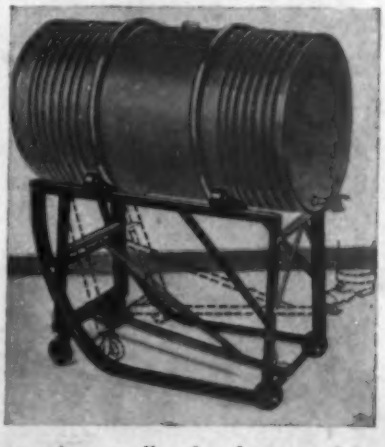
table moving in the opposite direction for the lengthwise cut. This brings the table back to its original position and eliminates the need for resetting the table between each cut. Tools used are double-end, straight shank end mills and adjustment for wear is provided on each unit through micrometer adjustment screws.

The spindles are of ball-bearing type, driven by V belts from individual, dynamically-balanced spindle motors. Each spindle is operated by an individual hydraulic cycle and all three spindles are geared for simultaneous operation.

Fixture table is hydraulically operated for the transverse feed stroke and rides on hardened and ground ways with a heavy center guide. The column of the machine carrying the three units also houses the piping and other hydraulic equipment. The coolant pump is mounted on the base and coolant is contained in the front part of the base.

Drum and Barrel Cradle

Industrial Products Co., 2820 North Fourth street, Philadelphia, is offering



new safety cradles for drums and barrels. It is said to make handling of drums and barrels safe and comparatively easy.

Rotating wheels at the top of the cradle frame allow drums and barrels to be put into position easily and quickly for removing part of liquid or for draining.

Wheels and swivel casters incorporated on the unit are of larger diameter, heavy duty type so that the unit may be moved to any desired location with comparative ease.

Gear Degreaser

Circo Products Co., Cleveland, is placing on the market a new model 35-S Dee Tee vapor cleaner for internal degreasing of machinery gear cases, enclosed transmissions, oil reservoirs and lines, heat exchangers etc. Its function is to create a constant flow of hot, clean vapors which when directed into transmissions penetrate the old, worn lubricant, washing and rinsing it free from the gears.

Because the vapors are heated to temperatures of 250 to 275 degrees Fahr., all moisture due to condensation is completely removed, and internal parts are left

in a dry condition, the company states.

Vapor generator tank of the equipment, which measures 30 inches high by 24 inches in diameter, has a capacity of 35 gallons. Solvent used is heated by means of steam coils and converted into hot vapors which later pass through the main control valve and into the vapor manifold. The latter has any number of outlets required, each of these being equipped with a control valve and flexible tubing which is used to direct the vapors into the machinery being cleaned. Connection to the housing or whatever is being cleaned is made by means of adapter plugs.

Solvent is supplied to the equipment from a drum, the transfer being made by means of two hoses connected to the drum. Proper solvent level is maintained automatically by a liquid level control. This turns on the pump whenever the level drops. In event the solvent is exhausted, the control causes a red signal light to come on, and shuts off the steam.

A check valve is used to prevent any

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INSIDE AND OUT -- INCLUDING DEEP POCKETS AND RECESSES -- IN HALF FORMER CLEANING TIME

HEAVY CAST STEEL VALVES—from the largest to the smallest sizes—with tough, thick walls for very high pressures—present a real tough cleaning problem. Sand, and scale from annealing, deeply embedded in deep pockets and recesses, must be removed from surfaces hard to reach.

A valve manufacturer known for his fine products throughout the world, solved this tough cleaning problem with a series of five Pangborn Air Blast Cleaning Rooms and two twenty-eight cubic feet capacity Airless ROTOBLAST Barrels. The valves are given a rough cleaning in one of the Blast Rooms—then a second blasting in the ROTOBLAST Barrel for the thorough scouring of valve faces and interior surfaces. Results, in the operator's words, are "the prettiest, cleanest castings you ever saw."

And — PRODUCTION is speeded up — COSTS are down — castings are delivered on time, UNIFORMLY CLEANED.

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

backflow of solvent into the pump. A motor control provides both overload and low voltage protection for the pump motor. As an additional safety measure, the pressure control is augmented by a thermostat. The latter functions only in event the pressure control fails.

Profile Miller

Earl A. Thompson Mfg. Co., 1300 Hilton road, Ferndale, Mich., announces an automatic profile miller which is said to make constant vigilance unnecessary. The success of the machine, in milling to close limits, is attributed to the simple, direct method of controlling pieces being machined.

Although adapted to the making of gun and aircraft parts of odd contour, the machine has great possibilities, it is

said, in postwar work—without making any design changes.

Head of the machine carries the cutter spindle, mounted on precision bearings within the quill. Latter has a silent chain drive and hardened, helical change gears, running in oil. The head is adjustable to 0.001-inch in positioning for work.

The spindle nose has a standard No. 40 taper. Both spindle and table are independently driven and controlled. The former features a selective speed range of 127 to 3435 revolutions per minute.

Work is carried on a 14-inch rotating table, hydraulically controlled by a cam and follower mechanism. Ground center hole in table facilitates positioning of work holding fixtures, and two adjustable program disks determine rapid indexing cycles and automatic table stop to meet

(*Please turn to Page* 118)

Typical cranking motor manufactured by the Leece-Neville Co. for starting excavating machinery, military and naval vehicles, trucks, tractors, rail cars, and busses —wherever diesel and gasoline motive power is used. For many years, this company has fabricated parts for these mechanisms from OSTUCO seamless steel tubing. Photo courtesy The Leece-Neville Co., Cleveland, Ohio.

Photo courtesy The Osgood Co., Marion, Ohio

YOU'LL FIND OSTUCO SEAMLESS STEEL TUBING WHEREVER GASOLINE AND DIESEL ENGINES DIG IN FOR VICTORY

Victory developments demand new roads, war-worker and war-material transportation on the home front. Far-off war fronts require new landing fields, roads and conveyance for men and equipment. In the myriad of Victory vehicles and machines performing these arduous tasks today you'll find OSTUCO seamless steel tubing on the job.

For example, OSTUCO supplies tubing for the pole pieces and field rings in cranking motors used in starting gasoline and diesel engines. This involves milling low carbon seamless steel tubing to meet strict dimensional specifications—maintaining desired magnetic properties—satisfying machinability requirements—and keeping pace with continuous refinements and design improvements.

What does this mean to you? It means that when you are ready to go ahead with the post-Victory production, OSTUCO will be ready with a reservoir of new experience on which you can draw to help meet demands for precision, volume output and low cost.

BUY MORE WAR BONDS

GET IN THE SCRAP

WRITE TO THE MEN IN SERVICE

BE ON THE JOB EVERY DAY

THE OHIO SEAMLESS TUBE COMPANY

MANUFACTURERS OF SEAMLESS AND ELECTRIC-WELD STEEL TUBING

SHELBY OSTUCO OHIO

Steel Landing Mats

Conveyors help turn them out by the square mile

By GEORGE R. REISS

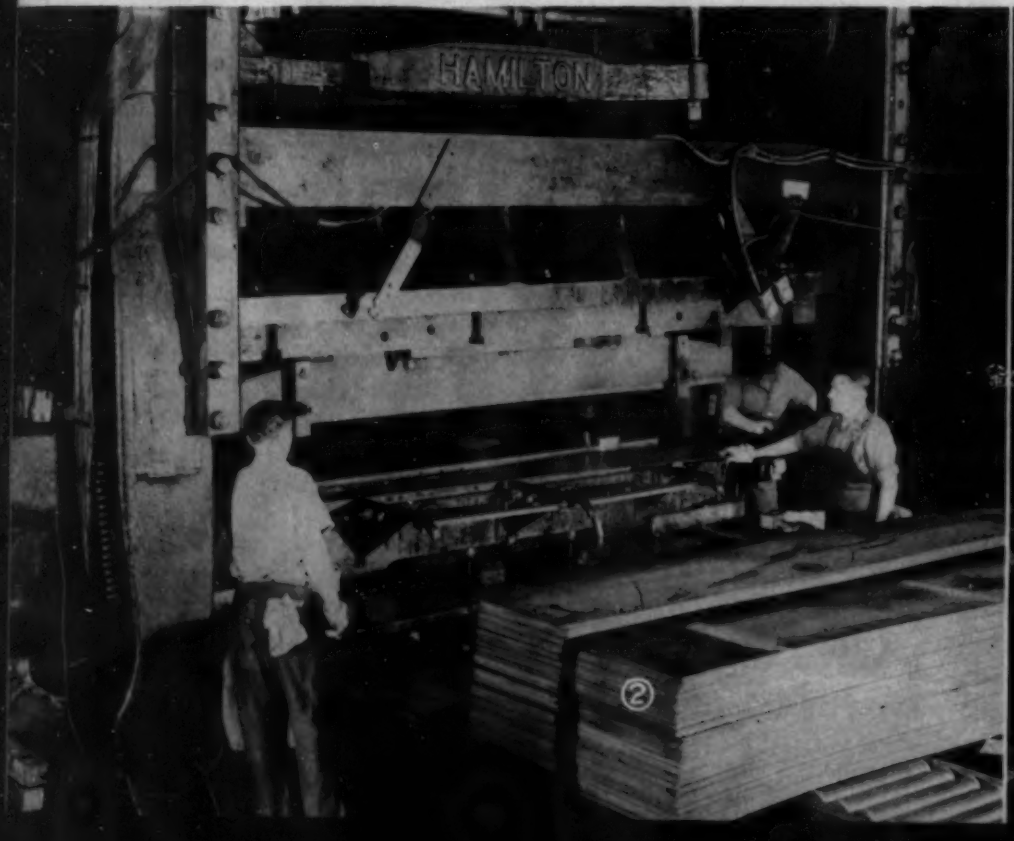
AMERICA'S steel fabricating plants have gone into the airport-building business in a big way.

The steel airport has become one of the nation's most important steel products. Steel stamping plants are punching out mile after mile of aircraft runways, sufficiently firm and solid to provide sure footing for the biggest four-motored bombers or the swiftest fighting planes.

Thousands of tons of light plate weekly are going into manufacture of the "plank" type airport to be used wherever American forces are fighting—the southwestern Pacific, Alaska, the Aleutians, North Africa, Iceland and elsewhere. They are credited with having a large share in the United Nations' aerial successes.

Already the plants have produced enough steel runway to build a great four-laned automobile highway nearly half way across the nation. And much more is on the way. Some 29 steel fabricating plants are devoting all or most of their production facilities to the making of these portable airports.

This type of steel landing mat consists merely of numerous steel "planks," each 10 feet long and 15 inches wide. They are perforated with many holes about 3 inches in diameter. These holes sharply reduce the weight, cutting shipping costs and problems and making



them easy to handle with a minimum of labor; besides they provide better drainage, aid in camouflaging the runways and provide better traction for the swift army airplanes. In addition the edge of each hole is flanged, thus increasing the strength of the section. These planks weigh only about 5 pounds per square foot or about 40 pounds per plank, against about 18 pounds per square foot or 200 pounds for unperforated planks of the same size.

Sets of slots and "bayonet" type locks on each edge of the plank are so arranged that the two can be fitted together easily when one plank is on an angle, and then when they are flattened on the ground, they fit compactly and firmly; a small metal pin in each locks them tightly together to form a firm landing mat which will not tear apart under the impact of a heavy plane's weight. But they can be picked up and reshipped quickly, merely by knocking out the pins, then lifting up the planks at an angle.

An important maker of these steel airports is the Youngstown Metal Products Co., Youngstown, O., a subsidiary of Youngstown Sheet & Tube Co. It is said to be turning out nearly double the production of nearly any other maker of the steel airport sections.

Youngstown Metal Products has arranged its steel landing mat production on a straight line handling basis. A carefully engineered system of roller conveyors between machines helps greatly in facilitating the flow of thousands of the steel "planks" through this big modern plant daily.

Forming these steel planks is an interesting process. The ¼-inch thick steel stock, sheared to length and width, arrives in bundles in freight cars or trucks, then is carted to the head of the conveyor line in specially designed low-hung motor carriers. There it is deposited on skids or roller conveyor sections.

The first steel plate is dropped on the roller conveyor and rolls to the first forming press, a huge Hamilton unit that exerts tremendous pressure. It is shown in Fig. 2. Note how piece is pulled endwise through opening in press frame at right where a belt conveyor carries it on to the next press.

Incidentally, the process varies in different fabricating plants, depending upon the equipment available. In some shops, the presses are quite light, taxed virtually to their capacity by the ¼-inch steel plate; in others, this proves comparatively light material for the heavy presses. Before the war, Youngstown Metal Products specialized in forming automobile running boards, tabletops

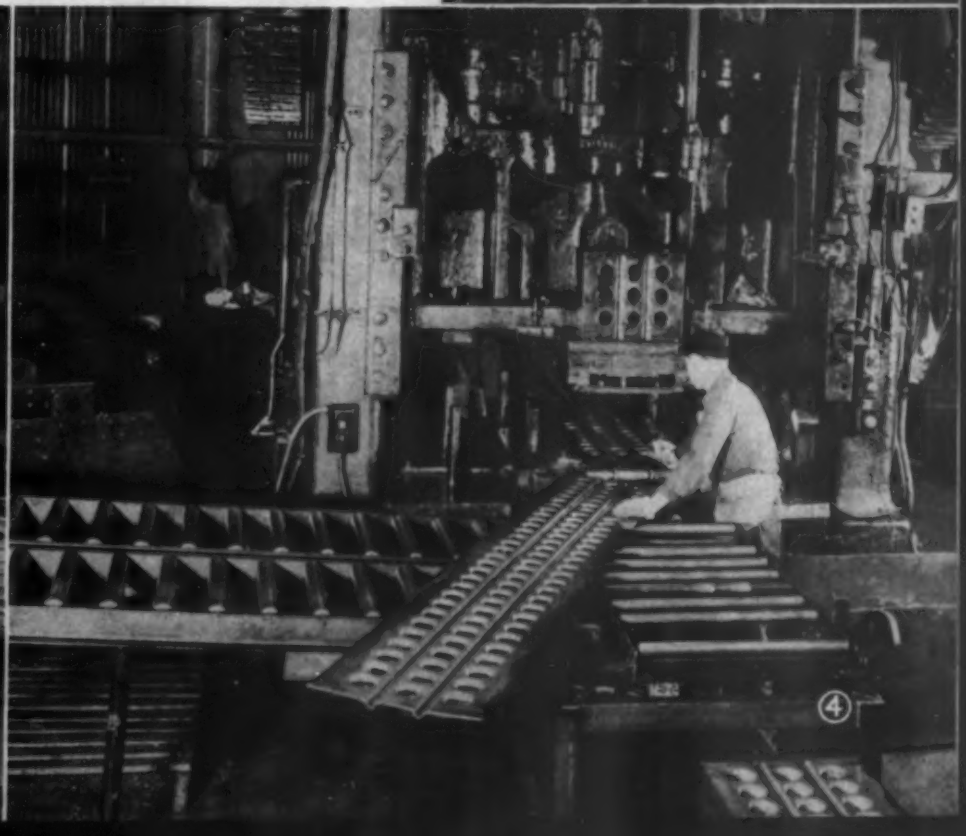
Fig. 1—Native help can be used to assemble landing mats in battle zones, for the operation is extremely simple. The airport thus made handles big 4-motored bombers as well as the lighter planes

Fig. 2—Sheared steel sheet starts conversion to "plank" by having two deep ribs formed in it here. From press dies, piece is fed through open end to conveyor (belt) lifting and carrying it to roller section feeding next press

Fig. 3—Work comes in from left, is pierced and flanged here, goes out to rear of press

Fig. 4—Next the interlock slots and bayonet prongs are cut on this unit

Fig. 5—Gerald G. Greulich, inventor of the portable steel airport shown here, examines a stack of "planks" stamped from steel. Inset shows how turned over bayonet type joint locks into slots of adjacent "plank". When inserted, bayonet joint is slid lengthwise and locked in place with pins



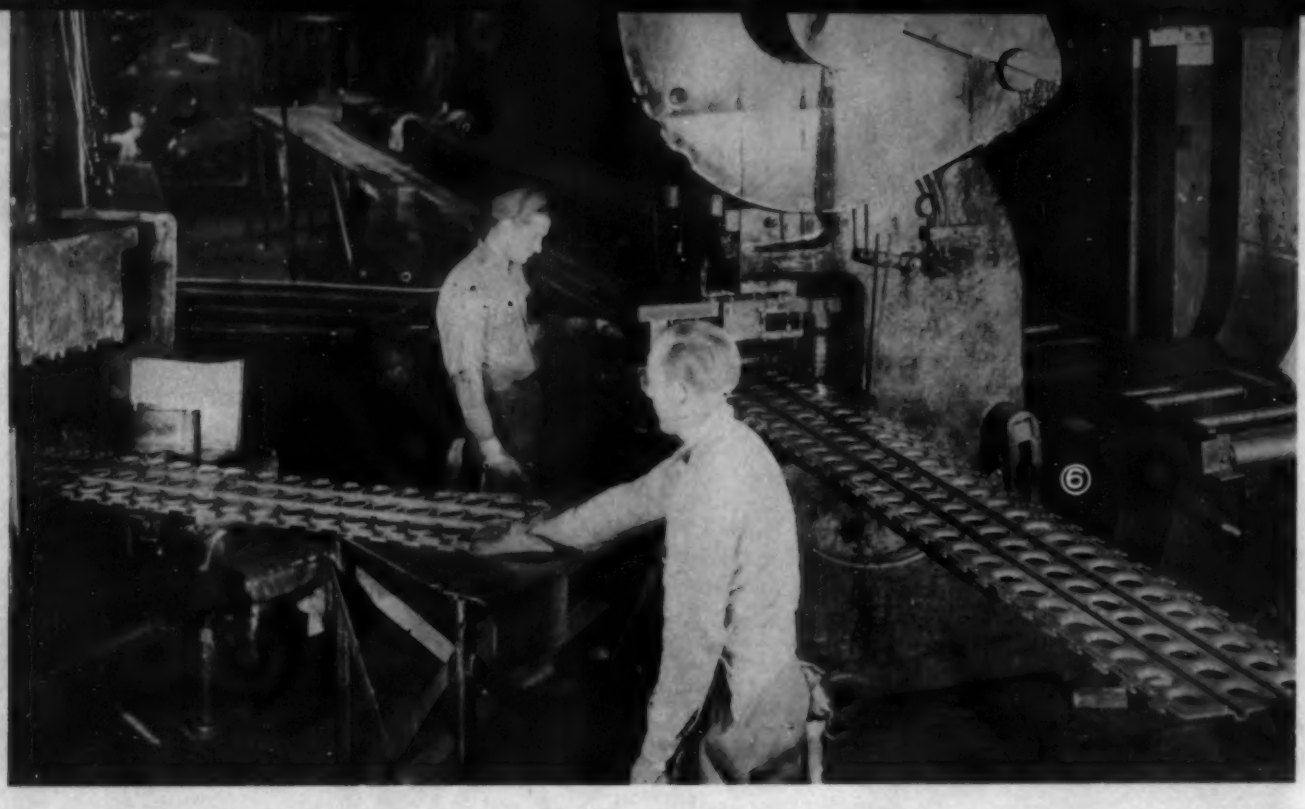


Fig. 6—Work arrives down conveyor, center, is cut to length in press at right, is transferred to unit at left which turns bayonet points down to correct angle

for stoves and in making other medium stampings. So its presses are ideally suited for the present job.

An operator pushes a single plank into the first press, Fig. 2, which forms two stiffening ribs with a single stroke. A second operator draws the plank out the other side of the press, depositing it on a short section of gravity roller conveyor which feeds it to a belt conveyor, extreme right, Fig. 2. The belt conveyor discharges it to a roller conveyor section that takes it to the next press, a heavy Toledo unit shown in Fig. 3.

There another operator grabs the plank, shoves it into the Toledo press a few feet at a time. At each position it pierces and flanges about a half dozen 3-inch holes at a single stroke, the metal disks falling out through the bottom die and being carried up into large steel scrap boxes by a tiny conveyor seen at the extreme right in Fig. 3. Eventually these will go back to the open hearths to be melted.

Planks Move at Fast Clip

A waiting operator at opposite side of press in Fig. 3 pulls out the perforated plank, drops it on a section of motor-driven roller conveyor which then speeds it along the production line to the next station. These press operators work at a great speed with the skill and accuracy of real experts. They are paid on tonnage rate basis. The planks move through the presses and down the conveyors at a good pace, about that of a man walking.

The next press is a Champion, which cuts the peculiarly shaped slots and bayonet locks on either edge of the planks a few feet at each stroke of the press. Then the work moves to the shears at the right center in Fig. 6. Here it is trimmed to exactly a 10-foot length —unless it's a special order. The 10-foot planks are standard. The sections are "staggered" when they are laid to form a runway, 5-foot lengths being used to fill out the runway ends.

The next press, extreme left, Fig. 6, bends the lock edges to a 90-degree angle. This is necessary to lock the planks together tightly on the field. Now the planks are ready for the paint shop. This shop is a huge affair, with an extensive overhead chain conveyor. The planks are hung on the conveyor on hooks, one end down. They are carried toward the paint vat. Here, a batch at a time, they are rolled out on a side-conveyor. Then this entire conveyor section is lowered, dipping the planks into the paint, which is the standard army color. It helps to protect the planks against corrosion on their long sea voyages and helps to make them harder to see from the air against certain types of terrain.

They are raised from the paint vat, moved back to the regular conveyor line, and then pass through a battery of infra-red lamps which dries the paint within a few minutes.

At the shipping floor, they are taken from the conveyor hooks, one by one, and are stacked neatly in bundles of uniform size. They are fastened tightly together with steel bands to form a good package for shipping. Then they are loaded into freight cars, usually open top type, for shipment to the seaports. They may make the final part of their journey by ship, truck or even transport plane.

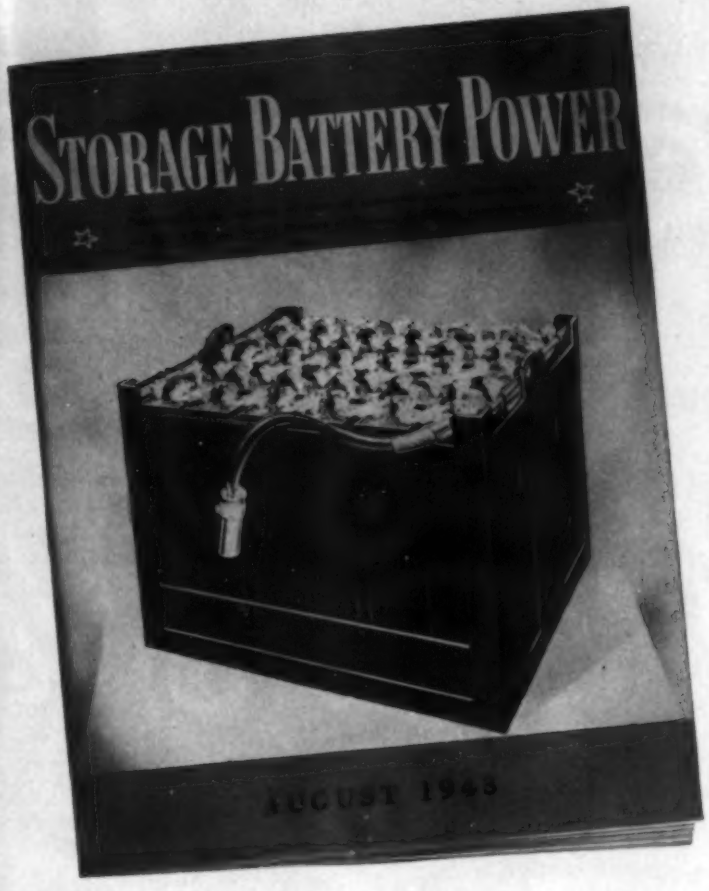
Installation Is Simple

Laying these new steel runways is not a highly-skilled job. In fact, it is so simple and foolproof that in many places where American forces are operating, bushy-haired native laborers are employed to lay the runways, as in Fig. 1. Often they are paid with bolts of calico cloth or trinkets or twists of chewing tobacco. The job consists of fitting the bayonet projections into the slots of the adjacent plank, then sliding lengthwise to lock the bayonet joint. Next locking pins or wedges, four to a plank, are driven in place to keep the bayonet joint tight by preventing lengthwise movement of adjacent planks.

Should it become necessary to move to a new location, the job can be done just about as swiftly. The parts are disassembled by knocking out the locking pins, sliding the adjacent plank to free the bayonet projections. Virtually any reasonably smooth piece of land is suitable for the new airport. Runways long and safe enough for fast fighters and bombers have been laid within a day's time.

The "plank" type airport is the invention of Gerald G. Greulich, specialty sales representative of Carnegie-Illinois Steel Corp. The corporation receives a royalty of $1 a ton from the steel fabricators. Greulich, before he perfected the device, had no particular interest

How Battery Industrial Trucks Speed Output of Army Tanks



Ingenious Coordination with Assembly Lines Reported in "Storage Battery Power"

In one of the nation's great tank assembly plants battery industrial trucks in the assembly line extend material handling beyond the physical and economic limits of the overhead cranes and feed parts to the line in a variety of operations unique in material handling.

While the application of the truck fleet greatly augments the flexibility of the assembly craneway, the truck fleet itself achieves maximum flexibility through the interchangeability of its units. The predominant unit is the platform lift truck which, through ingenuity of application, has acquired further versatility.

The plan of material handling, which is reported in the August issue of "Storage Battery Power," is remarkable for (1) the many kinds of handling jobs that are being done by the same kind of handling equipment, and (2) the large number of jobs that are being done by more than one kind of equipment.

For a copy of the August issue of "Storage Battery Power," address Edison Storage Battery Division, Thomas A. Edison, Inc., West Orange, N. J.

Other features in this issue:

How a manufacturer of heavy machinery increased capacity by adopting a crane-fork-truck method of handling—getting higher utilization of store-room space and supplementing shop crane for handling work in process and in erection department . . . How a shovel scoop truck handles loose material in bulk . . . How to lay out a charging station . . . Send for your copy of the August issue of "Storage Battery Power."

Edison
ALKALINE BATTERIES

Battling flames on the briny deep calls for a deep-drawn cylinder

Shown below is one of the many products built by Hackney for the war effort. This cylinder, cold-drawn to specifications by the Hackney process, is made of high-strength alloy steel.

A terror to men at sea—fire is now being controlled in many instances by the liberation of inert gases from steel cylinders where it is stored. The cylinders, in common with many other war products, are deep-drawn by the Hackney process. Light weight and uniform sidewall thickness are assured by cold-drawing while ample strength is provided by electrically controlled heat-treating.

Under the trade name "Hackney," Pressed Steel Tank Company has specialized in the making of seamless cold-drawn shapes and shells for more than 40 years. The Hackney Deep-Drawn Process has in many cases made it possible to save on scarce materials, as cold-drawing permits close control of metal thickness.

Hackney engineers have had much valuable experience in working with numerous concerns in many different war industries. It may be that your product can use the time- and material-saving advantages of the Hackney Deep-Drawn Process. Hackney is ready to help you. Write today for full details.

Pressed Steel Tank Company

MANUFACTURERS OF HACKNEY PRODUCTS

General Offices and Factory - 1461 SOUTH 66th STREET

Milwaukee, Wisconsin

DEEP-DRAWN
SHAPES AND SHELLS

in aviation and no fundamental knowledge of airports, but held patents on nearly 100 steel products, including the ice-free type of steel bridge flooring.

The idea came when the United States Army, long before Pearl Harbor, called together many representatives of steel companies and discussed the need for a steel landing mat that would be light, but strong; foolproof, yet simple. Military men had experimented for years with a landing mat idea, but had been unable to work out a suitable system for attaching the steel plates together swiftly and firmly. Welding was too expensive, would require too much time and labor and equipment to be practical in the field, and then would make it impractical to move the mats easily.

While an officer outlined what was wanted, Greulich made hasty pencil sketches on the back of an old envelope. When the officer concluded, he ventured: "Here's your airport."

Experimented at Home

Greulich took his idea home and his company made some samples. He laid a sample runway in his backyard at his suburban home. Tests showed some serious errors. The planks were too heavy, too conspicuous from the air and too slippery for good braking. Drainage was poor.

So Greulich decided to stamp them full of holes, the edges of which were flanged to retain strength. These cut the weight from 200 to 60 pounds per plank, without reducing strength or efficiency.

In case of damage by an enemy air raid, a crew of workers can merely lift out any damaged plates, fill up the holes in the ground and fit in some new planks, thus repairing damage that would take days with an ordinary hard-surfaced runway.

It is claimed this runway has the strength of 4 inches of concrete without any danger of damage by frost.

Engineers found the runways could be camouflaged easily. In fact, in tests of one such runway in the southeast, the camouflage worked so well it cracked up a friendly plane. A veteran Royal Air Force officer was flying from Washington to observe experiments with the landing mats and he had trouble locating one that was painted to resemble an orchard. Finally he contacted a radio station on the ground, asking landing advice.

"You're over the airport now," the ground observer advised him.

"Not me," he replied, "all I can see is a lot of woods and an orchard."

The officer refused to be convinced, landed elsewhere and crashed his plane.

.0001" Tolerance on 4 Sides

In one modern Pennsylvania plant, keys ranging in size from ¼ to 1⅛" wide and from ⅛ to ⅜" thick were ground to give a .0001" tolerance on 4 sides over all. There was only 1 reject in 2500 pieces.

THE DO-ALL HAS EVERYTHING

Here's a direct drive Surface Grinder with 1140 square inches of hand scraped bearings and mechanism safely sealed inside. A magnetic chuck holds work firmly without clamps. Vibration is practically nil because the DO-ALL is sturdily built—weighs more than a ton. Adaptable to wet or dry grinding. Comes in two models.

You'll like the DO-ALL—it's easy on the operator, easy on the work and easy on your budget. It will turn out super-smooth jobs for you in quick time and has a ruggedness that will stand the gaff of continuous operation long after other equipment has given up the ghost.

Send for data about the two DO-ALL models.

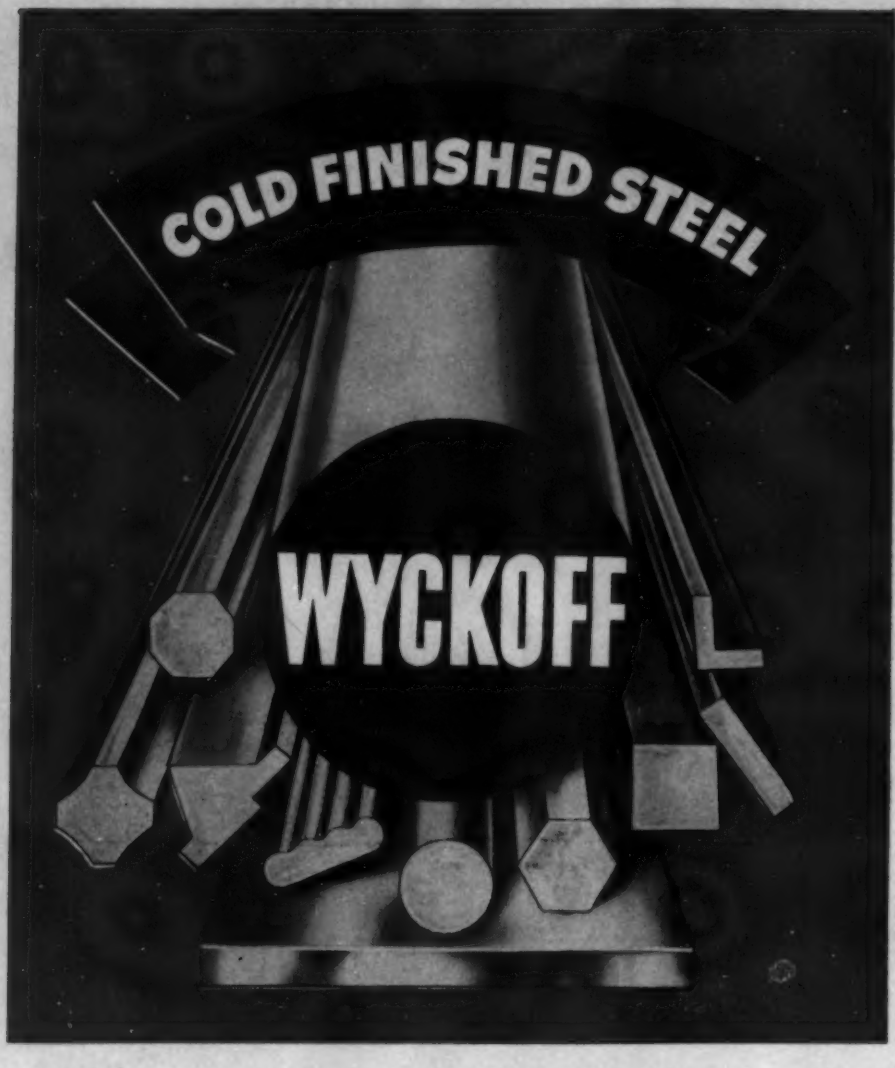
SAVAGE TOOL COMPANY

DEPT. S SAVAGE, MINN.

DO-ALL Offices in 25 cities, with a staff of trained engineers to give you quick service on Surface Grinders, Gage Blocks, Contour Machines, Band Saws and Files.

A Boring Cutter ground on the DO-ALL. Two cutting edges ground to .001. Clearance and step-down ground to .002. Keyway ground from side to side to .0001.

Fixture used to hold the Boring Cutter to 45° angle, tolerance held to .001.



Industry's Headquarters

FOR

CONTROLLED CARBON AND ALLOY STEELS • TURNED, POLISHED, GROUND AND POLISHED SHAFTING • ANNEALED, STRAIN AND STRESS RELIEVED, HEAT TREATED, QUENCHED AND TEMPERED STEELS • WIDE FLATS UP TO 12" x 2"

Our Army-Navy "E" Flag,—first awarded in July 1942, now carries two stars for continuous outstanding production. Wyckoff was originally given the Navy "E" award in January 1942 and the Navy Burgee "E" in April of the same year.

WYCKOFF ★ ★
DRAWN STEEL COMPANY
FIRST NATIONAL BANK BUILDING, PITTSBURGH, PA.
3200 SOUTH KEDZIE AVENUE, CHICAGO, ILLINOIS

(*Continued from Page* 110)

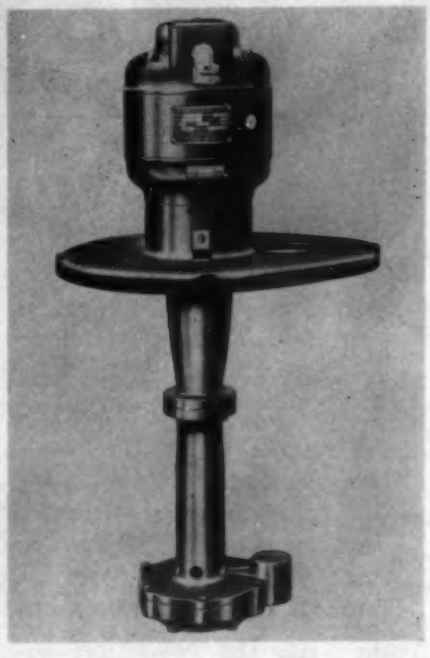
the requirements of a wide range of work. The entire machine, with the exception of loading and unloading operations, is automatic.

A few of its other features are—complete automatic hydraulic control of feed and rapid traverse, spindle quill lock, spindle drive clutch, brake and work table stop. A pressure and gravity lubrication system also is included. All working parts are fully enclosed.

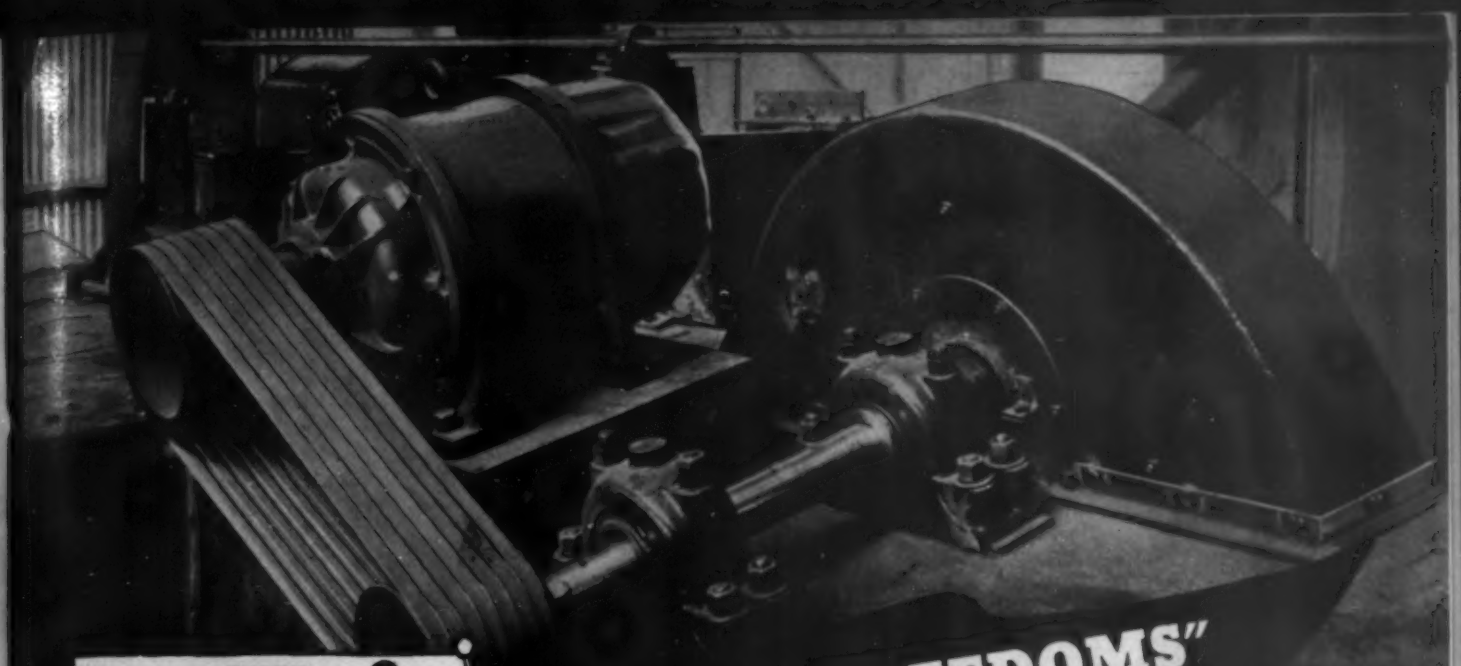
Coolant Pump

Ruthman Machinery Co., 1810 Reading road, Cincinnati, announces a new model TL vertical coolant pump capable of handling soluble coolants containing grit and abrasives without injury to the mechanism. It is designed for deeper immersion and is provided with an integral mounting flange which is usually bolted to the reservoir cover or bedplate.

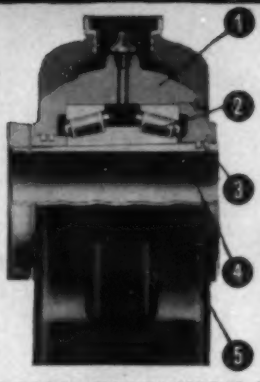
According to the manufacturer, no packing glands or friction seals are used in the unit, nor are there any bearings or metal-to-metal contacts below the mounting flange. The shaft, which rotates on two large ball bearings, is of one-piece construction. It extends from the motor through the tubular housing to the pump impeller. One ball bearing is mounted in the upper motor end bell, and the other within the mounting flange housing, providing sufficient distance between the ball bearings to maintain rigidity in the heavy shaft extension.



Weight and thrust of the vertical shaft is taken by the large lower ball bearing which is locked into position. This eliminates any change in the posi-



"FOUR FREEDOMS" THAT RELEASE *more power* for VICTORY



WHY DODGE-TIMKEN SPECIAL DUTY ADAPTER TYPE BEARINGS GET MORE POWER TO WORK:

1. Full ball and socket self alignment protects against wear and power-loss . . . also simplifies installation.
2. Dodge-Timken roller bearings provide full bearing capacity for radial and thrust loads . . . putting all the power in the job.
3. All metal automotive type piston ring seals keep grease in and dirt out, closing the bearing tightly against entry of foreign substance, but leaving it wide open to passage of power.
4. Long, split adapter sleeve distributes load over entire length of bearing . . . reduces pressure per square inch on shaft and eliminates peening action which causes rapid wear.
5. Rugged, well proportioned outer housing gives over-all protection to bearing.

These bearings are delivered completely assembled, ready for instant installation, capable of 30,000 hours' service under conditions for which they are designed; original lubrication lasts throughout 50 million revolutions. Available in a wide selection of types and sizes, suitable for all service conditions.

Typical installation of Dodge-Timken Special Duty Bearings and Dodge D-V Drive.

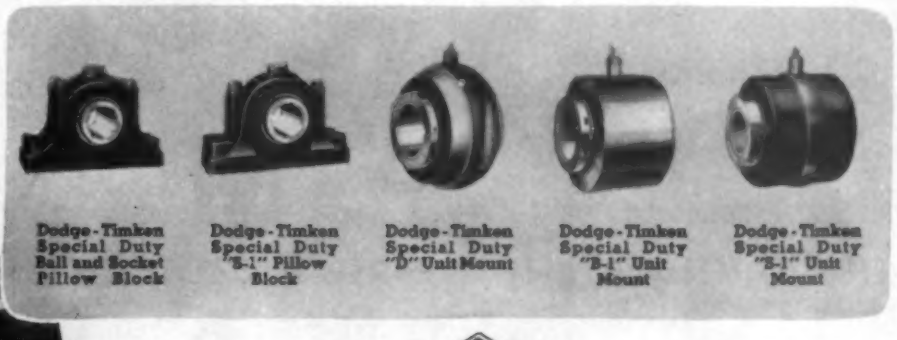
Freedom from friction . . . freedom from power-loss . . . freedom from *wear* . . . freedom from *maintenance!* . . . Dodge-Timken Bearings combine ruggedness, precision construction and smooth operating efficiency to bring those "four freedoms" to industry!

These rugged bearings keep power transmission channels free for full, unhampered flow of power to production machines. They prevent "clogging" of power-flow . . . they protect against slow-ups or "power blackouts" that are the ever-menacing maintenance threat of obsolete, worn out, friction-ridden bearings.

Now, and in post-war production, your plant can get more power *to work* with Dodge-Timken Bearings and other Dodge Power Transmission equipment.

Contact your local Dodge Distributor or write to

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana, U. S. A.



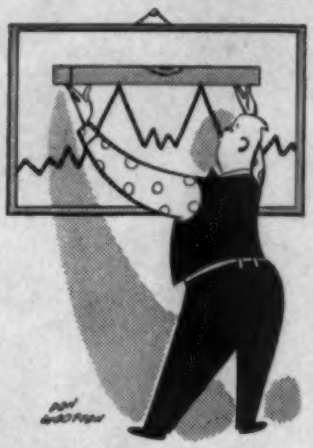
Dodge-Timken Special Duty Ball and Socket Pillow Block | Dodge-Timken Special Duty "S-1" Pillow Block | Dodge-Timken Special Duty "D" Unit Mount | Dodge-Timken Special Duty "B-1" Unit Mount | Dodge-Timken Special Duty "S-1" Unit Mount

DODGE
MISHAWAKA

THROW ALL YOUR SCRAP INTO THE FIGHT! BUY MORE WAR BONDS!

THE RIGHT DRIVE FOR EVERY JOB

PUT *ALL* YOUR POWER IN THE JOB



IS THIS ON THE LEVEL?

By leveling off the peaks and valleys of production, industry can fulfill one of its greatest social obligations to this country—and to the men now in the service.

By providing steady, year-round employment for its workers, industry will also gain all the advantages of a stable, efficient labor force—loyal workers, low costs and high-quality products.

Will not 500 workers continuously employed throughout the year provide more buying power and better community stability than 1500 itinerant workers employed only 3 or 4 months during the year?

That is the question we will have to answer. It can and must be answered affirmatively.

There are many tools of management engineering which must be applied to this important leveling off operation. And it's none too early NOW to start plans aimed at making continuous Postwar Jobs. Our organization has been working for some time on such plans for a number of clients. Can we be of help to you?

Geo. D. Trundle Jr.
President

THE TRUNDLE ENGINEERING COMPANY

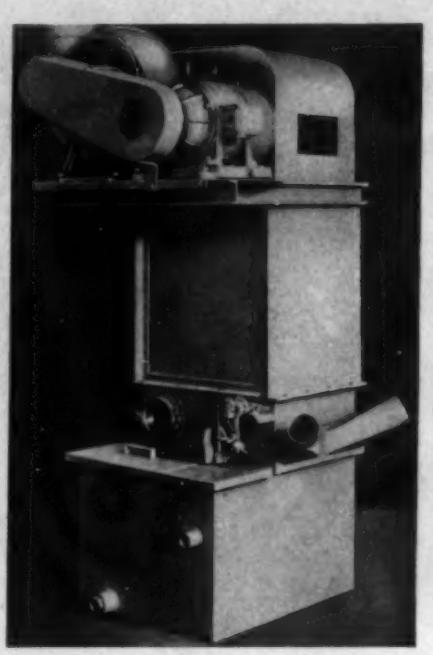
Consulting Management Engineering

GENERAL OFFICES · CLEVELAND · BULKLEY BLDG.
CHICAGO · City National Bank Bldg. · 208 S. La Salle Street
NEW YORK · Graybar Building · 420 Lexington Avenue

tion of the pump impeller both before and after the motor reaches its normal operating temperature. The pump is offered currently in two lengths from the mounting flange to the bottom of the pump—one 23⅝-inch and the other 19⅝-inch. It is equipped with ½-horsepower totally enclosed motor for continuous duty and ¾-horsepower motor for extra heavy duty.

Magnesium Collector

Industrial Equipment Corp., Detroit, reports a small size unit has been added to its line of orifice-type collectors. It has a capacity of 1200 cubic feet per minute and meets requirements of double-spindle



grinding and buffing lathes, although it is adaptable to many other kinds of work.

The collector is particularly effective in work with magnesium. Cleaning action is caused by the scientifically directed movement of air through an orifice. A compartment at the side collects the sludge and permits its removal. Water level is controlled by a diaphragm valve.

Electrical Connector

Cannon Electric Development Co., 3209 Humboldt street, Los Angeles, is offering a new type DP-B electrical connector adapted to radio rack assemblies, transmitters and any general applications where both plug and receptacle must be fixed permanently. It is rectangular in shape and is designed to fit rack equipment. The shell is tapered to effect a close fit when engaged and the two units of the complete connector are self aligning but are dependent upon the accuracy of the equipment it connects.

Insert insulation is of molded phenolic,

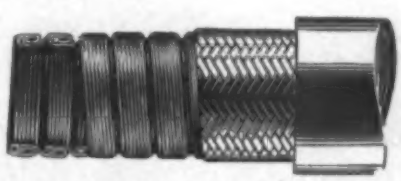
What sharp eyes they have

EVEN on moonless nights and in pea-soup weather our pilots can "see" their way to the enemy target, and back home again—thanks to the precision instruments with which their planes are equipped. Little wonder then that protecting the low-tension wires, the optic nerves upon which those all-weather eyes depend, is such an important task—and one that is often entrusted to American Flexible Metal Shielded Conduit.

And because of its unfailing protection, flyers hear their radio signals and instructions clearly, undistortedly . . . static interference can't gum up their teamwork as a combat group.

Protecting low-tension wires on delicate aircraft instruments is only one of the important jobs assigned to products of American Metal Hose. In industry, various types of American Flexible Metal Hose and Tubing convey water, gas, steam and oil; it's also used in vacuum service for removing filings and dust; as misalignment connectors or for absorbing vibration in pipe lines—to name but a few applications where these products serve with distinction.

When you have an application requiring metal hose or tubing, regardless of its nature, we invite you to "go American." For in the American line there's one that can probably help you do the job just a little bit better.



American Flexible Metal Shielded Conduit for the protection of low tension wires on aircraft instruments. Available either with fittings attached or in coils with fittings loose.

ANACONDA *American Metal Hose*

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury, Conn.
Subsidiary of Anaconda Copper Mining Company • In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

CMD

WELDERS' CHIPPING
HAMMERS
Speed Up the Job

TYPE CB
(shown above)

This time-saver has many practical features. Without setting down the welding rod holder, the welder can chip or brush away the slag and spatter. Weighing only 16 ounces and carefully balanced, this CMD Hammer is easy to use from any position. Ideal for use in close quarters. The wire brush can be replaced when worn.

Thousands of man hours can be saved for war production or maintenance work by equipping your welders with these convenient CMD Chipping Hammers. Well balanced, light and easy to use from any position, they speed up removal of slag and spatter. Designed by men who know welding, CMD Chipping Hammers do the job best. Available in several styles. Thousands in use. First choice of welders since 1925.

Order from your Welding Supply House!

If they cannot supply you, order direct! Descriptive circular sent free upon request.

TYPE C

Securely anchored head has chisel and drift. Carefully tempered to hold its cutting edge longer.

CHICAGO MANUFACTURING
AND DISTRIBUTING COMPANY
Dept. S., 1928 West 46th St., Chicago, Illinois

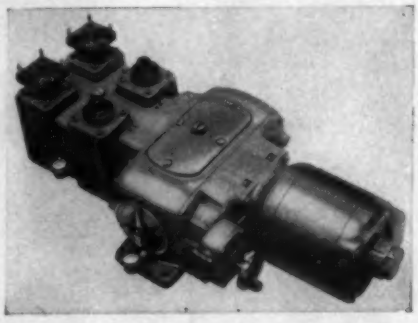
having 8 standard contacts of brass, silver-plated, and 2 coaxial contacts of the same material and finish, with isolantite insulators. Two contacts are of 30 ampere and 6 are of 15. Shell is die-cast aluminum alloy, with sand blast and clear lacquer finish. Four mounting holes are incorporated.

Variable-Speed Test Drive

Link-Belt Co., Philadelphia, recently developed a new self-contained variable-speed test drive for testing aircraft tachometers. It is motorized, fully enclosed, splash lubricated, all-metal construction, with ½-horsepower electric motor integrally mounted on one end.

The unit utilizes the basic Link-Belt V.R.D. speed variator, has an overall speed ratio of 10:1. It is furnished with four vertical drive shafts for mounting of tachometers, or with special swivel head to permit testing in either horizontal or vertical position.

Another feature of the unit permits selection of direction of rotation of each shaft. For example, it is possible to operate two tachometers in one direction and two in the opposite direction and test all four simultaneously.



Infinite speed control can be obtained at will, by turning of a hand wheel, requiring 5.84 total turns for the full 10 to 1 speed range. Hand-wheel operated vernier control, with a ratio of 7.5:1 or 30:1, can be furnished for more precise speed variation.

The new unit is equipped with dial and pointer for indicating the speed ratio setting. However, for more accurate requirements a fifth drive can be supplied on the gear box. This can be a shaft for connection to stroboscope or strobotron; or it can be a drive for connection to the master tachometer.

The speed change mechanism employs two pairs of opposed conical disks, between which an all-metal, side-contact V.R.D. roller chain transmits the power. On changing speed, this self-adjusting chain rises between one set of disks and descends between the other, so that while the input shaft, connected to motor, turns at constant speed, the speed of four output shafts is adjustable to the desired revolutions per minute. Speed changes are made without stopping the drive.

NEVER BEFORE IN ANY WAR...

THE MODERN *BOMBER*

nor the modern *Preformed wire rope*

THAT HELPS IT PERFORM

Yes, this is a new and different war. It's a long stride from the frail crates which crept across the troubled skies of 1918 to the modern bombers—today's fabulous flying artillery.

New, also, are the steel sinews of these great planes, made for the first time of Preformed Wire Rope. They convert split-second human reflexes into annihilating action. They race the decisions of alert, fighting brains to rudder, ailerons and elevators; to engines and guns; to turrets and bomb releases.

Preformed's peacetime record won this coveted war assignment. For nearly 20 years Preformed has protected and multiplied manpower. It has reduced delays from accidents and change-overs. It has cut costs. Total this—it means top-speed production, which today is imperative.

Ask your own wire rope manufacturer or supplier

Ask for this book

Tells you how to take care of small tools-Bolt Clippers, Files, Taps, Drills, etc. The boiled down facts to help you get the most out of these tools-use, wear, repair and selection. Handy pocket size. Just ask on a post card for-Porter's Tool Maintenance Book it's FREE

REG. U. S. HKP PAT. OFF.

PORTER CUTTERS

BOLT CLIPPERS — AUTOBODY REPAIR TOOLS — PRUNERS

H. K. PORTER, INC., 401 ASHLAND ST., EVERETT, MASS.

Stud Welding

(*Continued from Page 86*)

The arc inducing material serves as the flux and also adds material for the weld so that a generous fillet is formed encircling the foot of the stud. The welds produced are so uniform and of such high strength that studs may be bent over at right angles without breaking the weld.

How The National Stud Gun Works: Referring to Fig. 3, item 1 is trigger switch which operator depresses to start welding operations. Item 2 is latch which catches when gun is cocked by pressure on stud which compresses the forging spring. Item 3 is forging spring which forces stud into pool of weld metal when latch is released.

Item 4 is arm which is used for initially setting the "arc gap" between the stud end and plate to which it is to be welded. Item 5 is knurled clamp used for adjusting height of tripod to compensate for minor variations in planking thickness or various spacings between planking and the steel deck. Item 6 is tripod for supporting weight of the gun and to assure that the studs will be welded in a vertical position.

Item 7 is steel collet for holding stud during welding operations. Interchangeable collets with same external dimensions can be supplied for studs of various diameters up to and including ½-inch.

Item 8 is adapter head with retaining screw for preventing collet shank from being pulled out of adapter. Item 9 is dirt deflector mounted loosely on adapter shank to prevent flying metallic particles from entering the lower end of gun, where they might damage the sliding fits.

Item 10 is shank of adapter. Adapters with various shank lengths are supplied to provide for various thicknesses of planking. Item 11 is welding circuit cable connection to gun. Item 12 is solenoid plunger armature. Item 13 is solenoid coil energized by timing relay in control cabinet. Item 14 is solenoid plunger stem and insulating cap which hits the tail piece of the latch arm to trip the gun forging spring.

Item 15 is the electric interlock switch which automatically produces interruption of welding current when tail piece of latch is forced up by solenoid plunger stem at completion of each weld. This switch will close only when gun is cocked. Therefore, no welding circuit voltage can be applied to the gun parts even by closing the trigger switch (item 1) when the gun is not cocked. This switch also automatically prevents the operator from drawing an arc between top end of stud and lower end of collet when gun is removed from

Wherever Air Battles Are Fought . . . You'll Find JESSOP STEELS

Wherever American pilots are fighting, in the skies above Europe, Asia, or islands in the Pacific—there Jessop Steels are also. When enemy machine guns spit fire and ack-acks belch destruction, aircraft armor plate made in our mills obstruct their message of death. Light, medium, and heavy bombers, as well as fighters and interceptor planes of all types, are protected by Jessop armor-plate. Some are also equipped with Jessop non-magnetic steel for instrument protection, and others cleave the air with Jessop propellor blade steel. In addition, Jessop quality tool steels are extensively used in war production plants for machining and forming many parts of vital war equipment. Wherever air battles are fought, you'll find Jessop Steels.

ARMY E NAVY

JESSOP STEEL CO. JESSOP STEELS WASHINGTON, PA.

Established 1901

JESSOP STEEL COMPANY

Head Office and Works WASHINGTON, PENNA.

Landing Fields in a Hurry

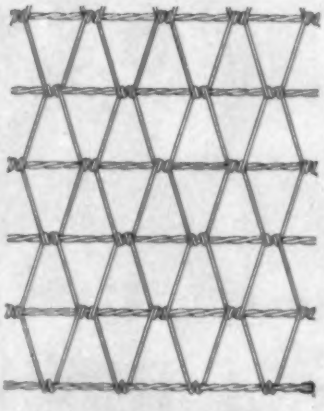
with the help of

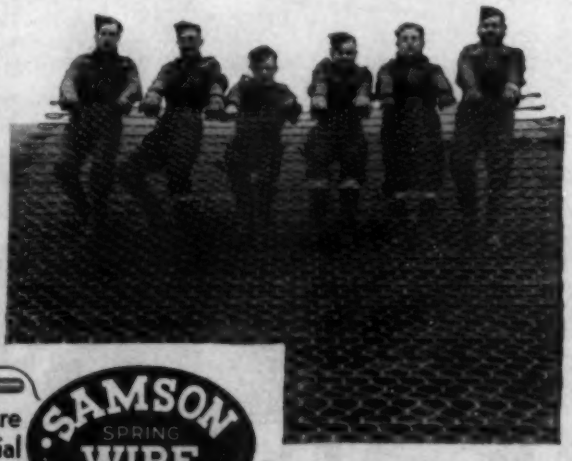
KEYSTONE Wire

Many advance bases near our fighting fronts are equipped with spot airplane runways in a hurry. Rolls of ready woven and reinforced fabric are quickly unrolled and anchored down. In a mere matter of hours satisfactory landing fields are thus created.

Here is a combat advantage wherein wire mill production plays a major hand. Keystone is supplying many miles of wire fabric for this use—as well as thousands of items to help equip planes, tanks, ships, and guns. Each day of this production brings us that much nearer Victory—when wire and wire mill products will again be rolling... to meet a pent up *civilian* demand.

One of thousands of wire mill products for war uses.





British "Tommies" laying chicken-mesh landing mat.

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position after completing a weld.

Item 16 is control circuit receptacle for connecting the three control wires in the gun to the control circuit cable leading into the control cabinet.

In the welding control cabinet is the main contactor which closes the welding circuit from the direct-current source, and interrupts the welding current when the timing relay energizes the gun solenoid, thereby tripping the latch. Also here is the timing relay which determines the length of time the welding current arc operates before the gun is tripped and the weld thereby completed. The timing can be set at any value from 1/30-second to 1 2/3 seconds by rotating a small knurled disk immediately below the calibrated timing dial.

An auxiliary 2-pole relay, or contactor, for applying control circuit voltage to the main contactor coil to the small contacts of the timing relay and to the current relay is mounted in the control cabinet. It also contains a current relay, which is operated by the welding current and which closes contacts to apply control circuit voltage to the operating coil of the timing relay. This current relay prevents false operation of the gun and the control system. It absolutely prevents the timing relay from tripping the gun latch, unless the welding circuit is actually completed through the stud end to the arc inducing material and thence to the steel plate material.

Custom Built Furnaces

(*Continued from Page* 90)

the furnace load (15,000 pounds when fully charged) and the ram system swings off vertical during a portion of the lift, necessitating strong base bearings and Barco oil feed swivel joints for supplying the oil under pressure to the cylinders.

The cast ram base bearings each weigh 75 pounds and are planed top and bottom on a New Haven planer. With the halves assembled and drilled for base bolts, grease cups and caps, the bearing units are placed on a horizontal boring mill and bored with a diameter of 3 inches plus 0.003-inch, minus zero.

The I-beam type tilting link of electric furnace steel is difficult to cast inasmuch as it is 7 feet long and has a number of thick and thin sections. It is planed, bored and spot-faced with a bar and wing cutter. The main bearing bore is precisely 6.6929 inches to insure a press fit for the roller bearings. To obtain this accurate dimension, it has been found advisable to bore within 0.005-inch and finish hone to size. The link is assembled with bronze shoes and drilled for its tie plates and the tension bar which equalizes

various stresses which are under load.

Upon completion of the tilting links in pairs for each furnace and, in order to tie the links to the rotating furnace fulcrum point, a trunnion which rotates in the link through the roller bearings is bolted to the furnace. The trunnion, also of cast steel, carries a short shaft which is finished and turned to 3.7396-inches to fit the inner race. The turning operation is performed either on a lathe or a boring mill. Both methds of turning are employed when production schedules are heavy.

For the purpose of readily aligning the furnace and to promote ease of assembly within the tilting mechanism, it was necessary to fit the trunnion with five aligning rollers to position correctly when lining up bolts. A jig is used for lining up the three holes required when drilling.

The curved cast steel tilting arms running from the trunnion to the column bearing are finished in the same manner as the tilting links. A plain, friction-type bearing is used at the column end since it actually takes no load, serving merely as a horizontal and lateral guide.

The hydraulic system shown in Fig. 3 is relatively simple in construction and assembly. The oil reservoir is welded from ½-inch plates and pressure is supplied by a direct-drive pump, either a 5 or 10-horsepower motor being used based upon the service requirements.

The new production setup at Ajax has made it possible for the company to meet its delivery schedules and, at the same time, the brass mills are obtaining equipment which is practically custom-made. The move has constituted a definite aid to the war effort since the furnaces have the advantage of high thermal efficiency and low metal loss from oxidation.

Conversion of production to a semi-standardized basis was difficult, but in the words of every engineering mind in the best American tradition, "If it is merely difficult, we do it at once; the impossible takes a little longer."

Spectrographic Analysis

(*Continued from Page* 105)

Figs. 8 and 11 show the calculating board and the scale board, respectively. In the procedure, the microphotometer readings for the iron reference line and the element line are referred to the calculating board on which has been plotted the characteristic curve for the particular plate. The logarithmic ratio of the intensity of the two lines is determined in the usual manner, by setting the hair line of the calculating board to a position on the plate curve corresponding to the density of the iron reference line. The lower scale block then is

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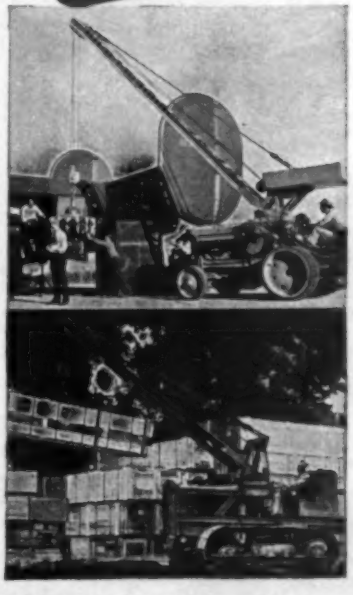

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moved so that the zero point is under the hair line. Next, the hair line is moved to a position on the plate curve corresponding to the density of the element line. At this position, the value read on the scale block under the hair line is the logarithmic ratio of the intensity of the two lines. The hair line of the scale board (Fig. 11) is set to the same value and the concentration, in per cent, is read from the analytical scale above, which corresponds to the line originally read on the microphotometer. The advantage of this arrangement over those previously described is, that it permits easy reading of the analytical results from one of 40 scales, without need for inserting other scales or thumbing through sheets of analytical curves.

Calibrated Two Ways

The equipment is calibrated for the elements and the ranges listed in Table I, while the particular spectral lines employed are given in Table II. This table gives the range covered by each line as well as the type of excitation source. A section of a typical arc and spark spectrum is reproduced in Fig. 5. Each spectrum appears in two different densities. To obtain this effect one-half of the total length of the spectrographic slit is covered with a neutral filter which allows only about 35 per cent of the total light to pass. This arrangement gives the effect of two spectra taken at different exposures. Many lines, too dark to read on the fully exposed part of the plate, may be read on the section of the spectrum photographed through the filter. Line pairs that are read on the filtered section are indicated in the table of spectral lines.

The laboratory is in continuous operation, performing both control and heat analyses for four electric furnaces, six acid open-hearth furnaces, and five basic open-hearth furnaces, all making alloy steel. Five operators are used on each shift. A sample consists of two cast pins of 7/32-inch diameter and 1½ inches long. All samples are sent to the laboratory by pneumatic tube. One operator is stationed in the excitation source room. As a sample is received the time is recorded on a form placed in front of the tube terminal. If it is the first sample for a particular heat, the specifications and the name of the customer are recorded as well.

The two test specimens are prepared for analysis by grinding a dome-shaped end on each pin. This is done with the special grinder shown in Fig. 4. After preparing the sample, the pins are inserted in the electrode clamps shown in Fig. 10.

For routine steel analysis, the spark

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source operates at 40,000 volts with a condenser capacity of 0.016-microfarad and a clamping resistance of 1 ohm. No added inductance is used in the circuit. The exposure time under these conditions is 40 seconds at a source-to-slit distance of 80 centimeters. A 20 second pre-exposure is made. For routine alternating-current arc exposures, a secondary current of 2 amperes is used, at 4800 volts. The exposure with this source is 30 seconds at a source-to-slit distance of 30 centimeters. No pre-exposure is made.

As soon as a plate has been exposed, a second operator, stationed in the darkroom, removes it for developing. While the plate is developing, the spectrograph is reloaded so that the next group of samples may be exposed immediately. The loading of the spectrograph from the darkroom is made possible by the light-tight leather hood which extends from an opening in the darkroom wall to the plate holder of the spectrograph. All exposures are made on Eastman Spectrum Analysis Plate No. 1 This plate can be processed in 3 to 4 minutes. About 80 dozen plates are used in one week.

Composition Is Computed

After a plate is developed the darkroom operator brings it to the spectrum reading room (Fig. 3) where three operators are stationed. The first operator reads the microphotometer, calling off the density values of the various lines to a second operator stationed at the calculating and scale board position. After computing the percentage compositions, he calls off the results to a third operator stationed at the telautograph. This operator posts the results on the record form for each heat and reports the results directly to the various furnaces over the telautograph.

Of the five men conducting the analyses, one is the foreman. He is usually the one stationed at the telautograph position. It is his duty to scrutinize all analyses for unreasonable results, and to determine whether or not checks are necessary before reports are made. He also computes the elapsed time for the analyses, to make sure that the laboratory is reporting the results with the required speed.

About 5000 determinations are made by the spectrographic laboratory in one week. A typical day's operation is shown on the chart in Fig. 6. The time period refers to the arrival of the samples in the laboratory. Thus, during the 15-minute period from 6:00 to 6:15 a.m. five samples were received, with the request to analyze them for a total of 20 elements.

Analyses samples taken during the

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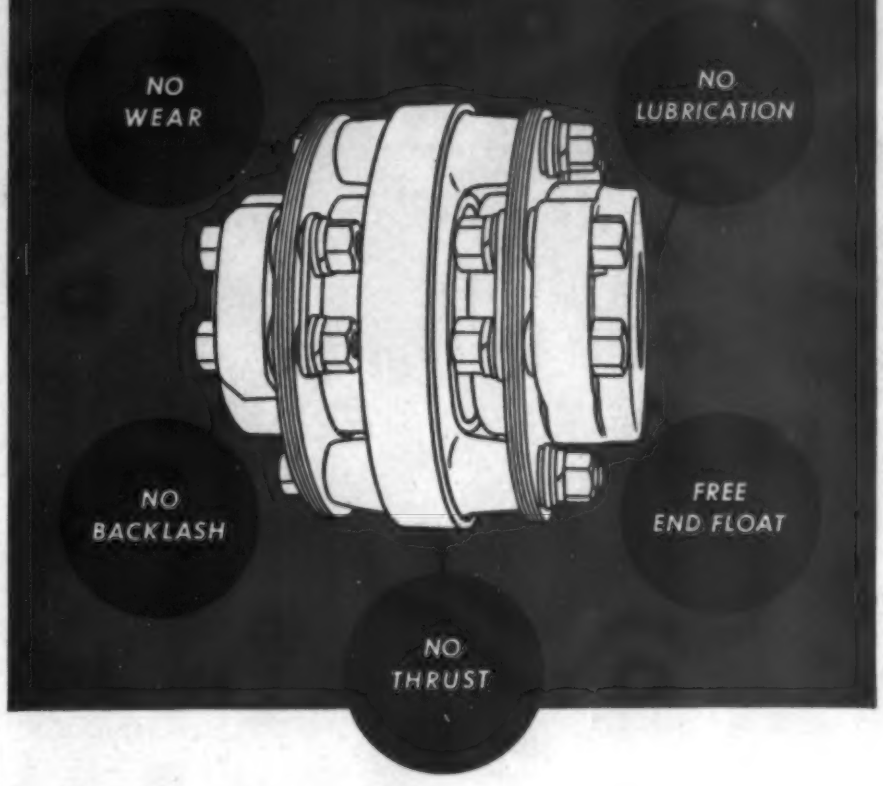

This type of coupling was designed for Heavy Duty Medium and Low Speed service where extreme flexibility is essential in order that both misalignment and end float can be taken care of without setting up an ounce of pressure on the bearings, at the same time eliminating backlash wear and lubrication, all of which are essential features for a permanent, trouble-free installation not found in any other make of coupling. Send for a Thomas catalog which shows many other types of couplings for all industrial uses.

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refining of a heat usually are reported in less than 15 minutes. Many single determinations are reported in 9 minutes, while during peak load conditions, the analyses of eight elements may take as long as 25 minutes.

The results from the laboratory have been found as accurate as those obtained by the standard methods of chemical analysis. For some steels, and for certain elements and ranges, the spectrographic method has been found to be even more accurate. This is true for silicon in complex steels, molybdenum in tungsten steels, tungsten below 1.00 per cent, and for most elements present in concentrations below 0.20 per cent.

At present the laboratory is working on calibrations to permit the extension of the silicon range to 2 per cent, the molybdenum range to 9 per cent, the tungsten range to 20 per cent. and the chromium range up to 15 per cent.

"Planned" Lubrication

(*Continued from Page 99*)

More and more, women are now being added to the lubrication personnel. Specialization allows them to take over some of the less hazardous and more delicate operations. Due to this specialization, also, the training period has been shortened from months to weeks.

Right here, we wish to bring up a point which we believe should be adopted more universally. We feel that the names of "oiler" and "grease monkey" are no longer applicable where the person has developed any degree of skill; we use the term "lubrication service man or woman". The names "oiler" or "grease monkey" always bring to mind a period of some 15 years ago when a dirty-clothed man went around the plant with filthy rags hanging out of his pockets and oiled everything in sight out of one can. It he happened to run out of oil with only a few machines left, a good spat of tobacco juice on these parts sufficed—it looked like oil, and that was all that was necessary. A far cry, indeed, from the efficient, highly specialized lubrication personnel who are responsible for ALL lubrication. *The operator of the machine is not permitted at any time to lubricate his own machine.* His time is devoted wholly to production.

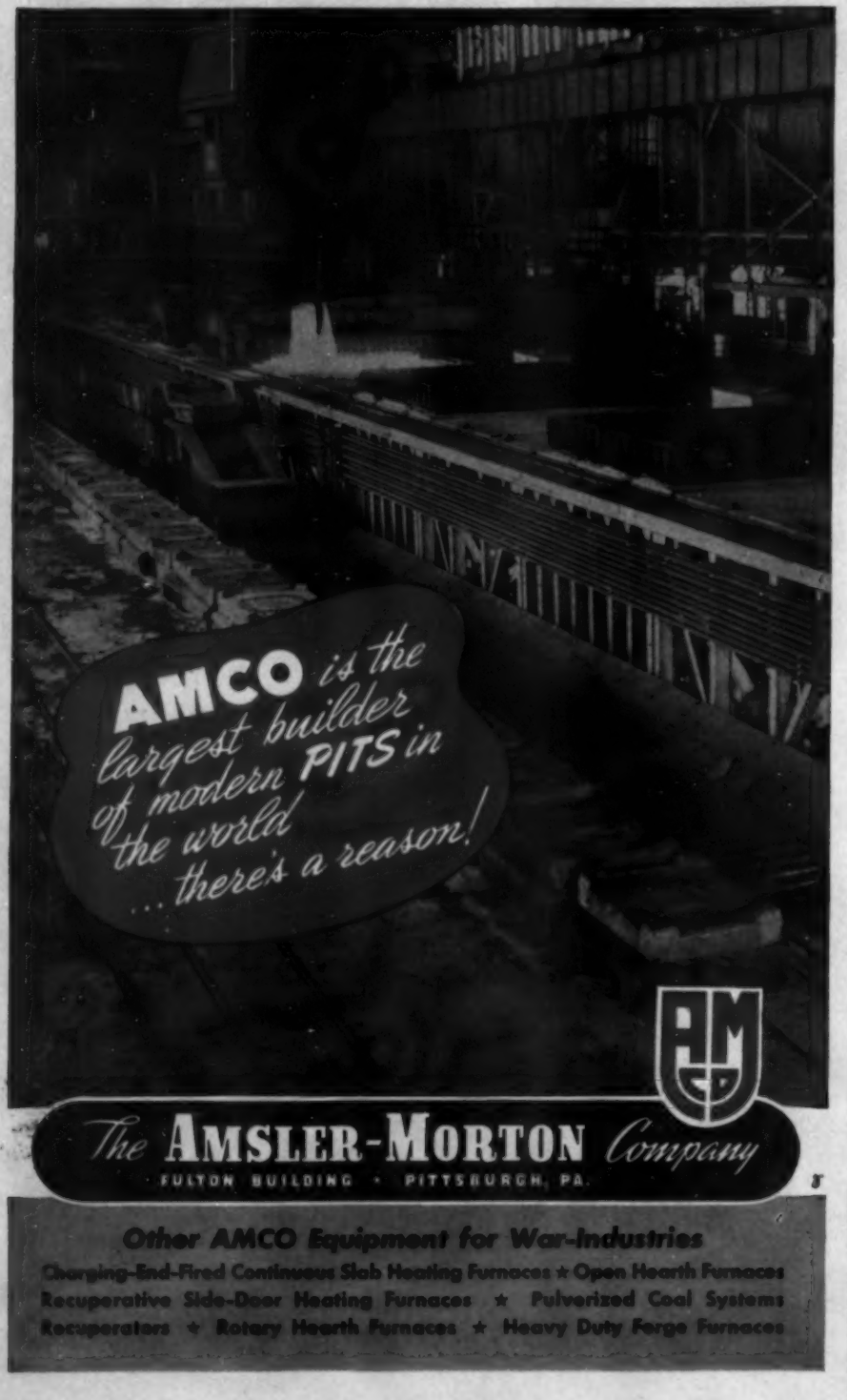
In order to assure an adequate supply of lubricants at all times, three additional surveys were made by other companies. In several instances, it has been necessary to avail ourselves of an alternate supply when the major supplier failed to make delivery. Tests are being constantly made in a small way with oils supplied by the alternate companies for comparative purposes.

A record is kept of the lubricants used each day and when the minimum number of drums is reached, a new supply is automatically ordered.

At the present time larger oil cups and multiple oilers are being installed wherever possible. This, in one instance, has enabled one man to do the work formerly done by two; in another instance, the oiling time on a particular machine was cut 75 per cent.

The time for draining reservoirs has been cut from approximately 15 minutes to 4 minutes by the use of a suction pump. After the oil is drained, the reservoir is refilled with a flushing oil. This special flushing oil allows the machine to operate from one to two shifts, thoroughly cleaning out the reservoir. The drained oil is reclaimed during this interval and is used in refilling the reservoir. In each case, after the drained oil has been reclaimed, a sample is sent to the laboratory for testing; their okay must appear on the drum before it is reused.

A study is still being made to determine just the right amount of grease for electric motors. This is done by recording the number of ounces of grease required for each make, type and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size of motor, so it will operate most efficiently. This is important since all machines are individually motor driven and half of the 6000 or more motors are grease lubricated. Under or over greasing would seriously hamper production. The greasing of motors, as stated before, is done by one man who specializes in this phase of the work. He is also on the lookout for tight belts, misalignment of pulleys, overheated motors, etc.

Oil and grease stations are placed at convenient locations throughout the plant. A tank wagon equipped with continuous flow, metered air-powered pumps is used whenever it becomes necessary to add oil to the reservoirs. The oil is metered so that the quarts or gallons can be posted on the daily record card. If a machine is using too much oil, the posting on the card will bring this to notice; the cause is then investigated and remedied. Likewise, air pressure grease guns are used for general greasing and for other large volume work.

The lubrication plan described has been in operation now for almost a year and its success can best be judged from the fact that the down time, based on productive hours, has been considerably under 1 per cent.

Electrostatic "Detearing"

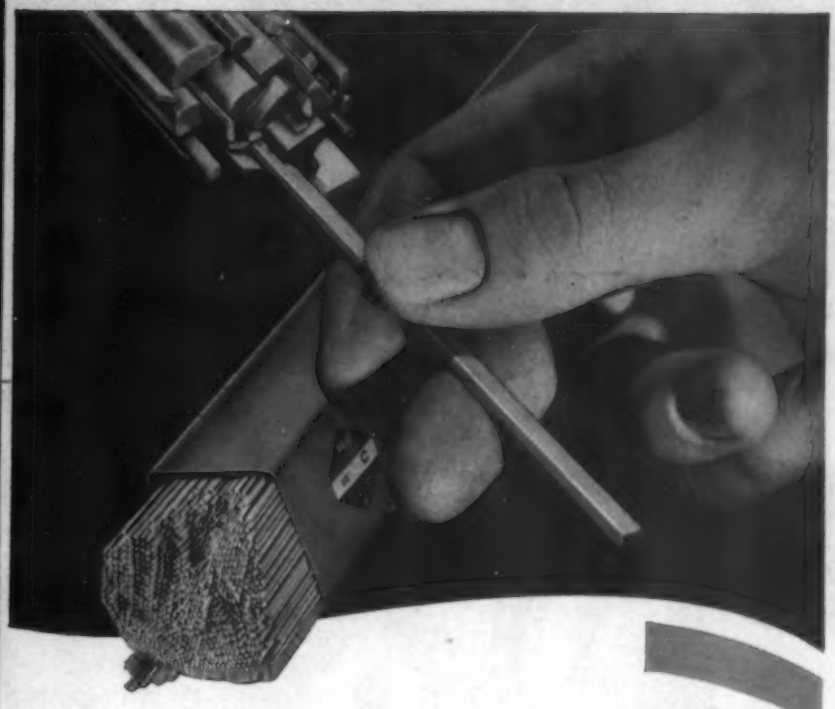
(*Continued from Page* 106)

its adjustment within rather broad limits. Highly desirable results can also be obtained from materials which are normally considered nonconductors, such as pottery, wood, short pieces of bakelite, etc., although in some cases where the dielectric is extremely high, it is necessary that the distance between the electrodes and the article be lessened appropriately. In many cases the use of this method will make it possible to dip articles which otherwise would have to be sprayed.

There are two major limitations to the effective use of this method. It is obvious that if a coating material is sufficiently thermoplastic to cause a harmful reflow during the subsequent bake, the advantages of the process are eliminated. The other major limitation is that where the radius of the "drain-off" point is too large, this process does not strip the excess material sufficiently to leave a resultant film of the required uniformity and quality of appearance.

An interesting aspect of this development is its effect on baking requirements. It is well known that it is impossible to properly bake out most of the alkyd synthetics and oleo-resinous types of materials where there is a normal film of coating material on some sections and an excessively heavy coating on other sections. In some cases this

PAGE for WIRE



With mills practically at capacity producing wire for war and for essential industry, users of wire find that there are many things that they can do to conserve essential materials.

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WELDING ELECTRODES: Be certain that electrodes are correct in analysis for the job. Lean toward larger sizes for economy. See that no excess metal is deposited in the weld and that your men use electrodes right down to the holder.

GENERAL WIRE: The situation in such products as Spring Wire, Bond Wire, Telephone Wire, etc., is not subject to early improvement. It continues to be important to check waste.

If PAGE experience can help you work out any of these details, we will be glad to cooperate.

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results in a soft or tacky, or even a wrinkled condition, at the heavily coated sections. On the other hand, where the coating material is of a polymerizing (heat setting) type, an excessive amount of coating produces a very brittle condition with resultant hazards from easy chipping or flaking off of the article during subsequent handling.

Several years ago, when adopting this method on a production basis in our own housewares division, we enjoyed a very interesting experience. In the department which coats our line of wire goods, we have long used two dips in an alkyd synthetic which was designed to produce as little of the fatty edge condition as possible. It was always necessary for us to use considerable labor in patching sections where the fatty edge was invariably present. Under these conditions we were using a 30-minute bake and occupying considerable floor space for patching operations. Our new electrostatic detearing process made possible the use of alkyd ureas which produced a far superior film with only a 10-minute bake. *We, therefore, tripled the production of our oven and conveyor capacity, and produced a far superior product with less than one-third the labor formerly involved.*

There undoubtedly will occur other interesting ramifications on the effect of the new excess material removal process on bake oven requirements. The Harper J. Ransburg Co. developers of this electrostatic "detearing" process at Indianapolis offer its facilities for experimenting on various coating problems to any war production plant.

Calibration Plate Controls Welding Heat Closely

A new direct-current welder calibration plate claimed to give exactly the right heat across the arc for each electrode is announced by Harnischfeger Corp., Milwaukee.

Called the Visi-Matic, it is designed to provide for all variables of amperage and voltage coincident to using today's wide range of coated e'ectrodes, and by its single-current control, reduces proper selection of welding current to the simplest form.

Calibrated in amperes, the new plate can be used with any make of electrode, the company states.

Compensation for variations in voltage with the amount of current or amperes, as required by variations in electrode coatings, is attained by merely turning the one current indicator to the amperage setting desired in either the low, medium, or high voltage band. Individual color bands are to designate the voltage ranges.

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Helpful Literature

1. War Production

Reliance Electric & Engineering Co.—8-page illustrated broadside, "What Am I Doing?" pictorially explains how workers in all departments are producing parts for equipment which is participating actively in conduct of war. Relation of electric motors to guns and ammunition is shown.

2. Testing Machines

Riehle Testing Machine Div., American Machine & Metals, Inc.—16 pages of catalog insert sheets describe "Riehle" precision pendulum load indicator, autographic recording attachments for pendulum load indicators, averaging dial extensometer, reduction of area gage, hydraulic brinell hardness testers and depth of penetration indicator.

3. Safety Equipment

Oakite Products, Inc.—5-page special service report discusses care and maintenance of such safety devices as respirators, goggles, face and eye shields, welding helmets, rubber gloves and other safety equipment. Solutions to be used for cleaning and preserving equipment are covered.

4. Pneumatic Control

Leeds & Northrup Co.—15-page illustrated catalog No. N-00B stresses use of "Micromax" pneumatic control for regulation of pH, conductivity and other conditions, as well as temperature. Equipment resets itself whenever necessary so that all forces which tend to upset controlled condition can be neutralized. Catalog gives standard ranges, dimensions and shipping weights.

5. Pot Furnaces

A. F. Holden Co.—23-page illustrated booklet gives information on pot furnaces and baths for heat treating at any temperature from 300 to 2350 degrees Fahr. Among subjects covered are gas or oil fired recuperation pot furnaces, electrode pot furnaces with metal and ceramic pots, immersion electric pot furnaces with "Calrod" units, atmospheric furnaces requiring no blower, and three types of steel and ceramic pots.

6. Steel Data

Joseph T. Ryerson & Son, Inc.—160-page "Steel Data Book" contains SAE-AISI specifications and comparisons, weight and conversion tables, tolerances and specifications, and includes miscellaneous helpful tables and data on steel. This is one of a series of informative booklets prepared for steel buyers and users.

7. Liquid Heaters

Ross Heater & Mfg. Co.—16-page illustrated bulletin No. 3623 on "Instantaneous Heaters" gives complete information on line of straight and U-tube heaters in which water or other liquid is circulated through inside of tubes and is heated by steam in shell surrounding the tubes. Capacity ratings are included and columnar chart facilitates determination of required steam line size.

8. Butterfly Valves

R-S Products Corp.—4-page illustrated bulletin No. 16-B contains dimension tables and other data on butterfly valves for 15 to 125-pound per square inch service. Described are manual and automatic valves for regulation and shut-off duty for air, gas, steam, liquids and semi-solids.

9. Wheel Dressing

Norton Co.—20-page illustrated booklet, "How to Use Truing and Dressing Tools for Better Grinding," outlines methods of maintaining properly selected grinding wheels at high cutting efficiency throughout their life by intelligent truing and dressing. In addition to explaining step-by-step procedure, pertinent questions are answered regarding wheel dressing practice.

10. Lubricants

Swan-Finch Oil Corp.—38-page illustrated booklet, "90 Years of Industrial Pioneering," traces progress in development of lubricating oils and explains how these products are contributing to war effort. Lubricants for aviation and automotive industries are described. Old time industrial prints are used to illustrate text.

11. Profile Grinder

Sheffield Corp.—4-page illustrated bulletin on "Micro-Form" grinders explains design, operation and applications of this precision machine which has pantograph movement and microscope. Machine will finish grind accurately any desired profile within its range directly from original drawing.

12. Cooling Controls

Sarco Co.—12-page illustrated bulletin No. 700 on cooling controls, covers self-operated temperature regulators and mixing valves which are designed to control cooling circuits on internal combustion engines, compressors, condensers, degreasers, stills and similar equipment. Typical hook-ups are shown, together with capacity tables, prices and other data.

13. Dies & Taps

National Acme Co.—52-page illustrated catalog No. D-2 gives complete information regarding circular and radial chaser dies and taps for revolving and stationary spindle machines. Also covered are parts for discontinued "Namco" collapsing dies; pipe threading taps, dies and machines; and chaser grinders, fixtures and adaptors.

14. Wire Rope

Wickwire Spencer Steel Co.—32-page illustrated booklet, "Know Your Ropes," is manual of wire rope selection, application and usage. Application and maintenance procedure for obtaining maximum service from wire rope in all types of uses are outlined. Engineering data and other pertinent information are included.

15. Gas Furnaces

Johnson Gas Appliance Co.—20-page illustrated catalog No. 43 covers furnaces, burners, blowers, torches, mixers and valves for industrial purposes. Specifications are given on various models of pedestal, bench and floor type heat treating, melting and other gas fired furnaces.

16. Power Hammers

Yoder Co.—4-page illustrated bulletin on "Power Hammers" is descriptive of models K-90-M and LK-90-M special high-production metal forming machinery. Full specifications are presented on these power hammers which are built for bending, forming or planishing of light gage shapes of sheet metal.

17. Surface Plates

Barco Scraping Co.—4-page illustrated bulletin on "Barco Mechanite" surface plates describes construction and accuracy of these surface plates which are used in machine shops, tool rooms and inspection departments.

18. Retaining Rings

National Lock Washer Co.—8-page illustrated catalog No. R.R.-6X contains specifications and list prices of type X square and round section heat-treated spring steel retaining rings in diameters ranging up to 8 inches.

19. Planetary Milling

Plan-O-Mill Corp.—18-page illustrated catalog on "No. 5 Plan-O-Mill" describes this planetary milling machine for larger parts. Hydraulic feed and speed control incorporated in this machine permit precision threading and form milling on large and cumbersome parts. Parts remain stationary during operation.

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20. Duplicator

Turchan Follower Machine Co.—12-page illustrated bulletin describes "Turchan Follower" hydraulic duplicating equipment capable of being attached to any standard type lathe, planer, shaper, grinder or milling machine. Advantages of this method for machining parts having irregular internal or external contours are explained.

21. Lathe Instruction

South Bend Lathe Works—8-page illustrated circular No. 8-A gives complete information regarding two full-color, 16-millimeter, sound, apprentice training films entitled, "The Metal Working Lathe" and "Plain Turning." In addition to describing contents of films, information is given on how they may be obtained.

22. Abrasive Wheels

Sterling Grinding Wheel Div.—78-page illustrated catalog, "Sterling Grinding Wheels," discusses abrasive materials, bonds, wheel breakage and safety tips. Standard types of grinding wheels are described and full specifications and list prices given for all types.

23. Flexible Metal Hose

Titeflex Metal Hose Co.—36-page illustrated bulletin No. 113 deals with industrial applications of line of flexible metallic tubing. Available types are described for use in conveying oil, gas and liquids. Complete data are included on industrial and SAE fittings. Technical information is included in pressure charts, radius of bend charts and tabulated data.

24. Needle Bearings

Torrington Co.—8-page illustrated bulletin on "Needle Bearings" covers all types and sizes of these units which consist essentially of full complement of small-diameter rollers. Various types, available sizes and their applications are described.

25. Unit Power Plant

Ready-Power Co.—4-page illustrated bulletin No. 92B describes standard model H "Ready-Power" industrial truck plant for producing 36, 48 or 60-volt current to drive 2 to 5-ton electric trucks. Liquid cooled gasoline engine unit drives six-pole compound wound generator.

26. Fastening Device

United Screw & Bolt Corp.—12-page illustrated bulletin on "United Clutch Head Screws" describes these fastening devices with patented heads which may be used with ordinary screwdriver or with special assembly bit. Slot is so designed as to grip bit on slight reverse movement and release with power of driving.

27. Gear Speed Reducer

Link-Belt Co.—32-page illustrated "Link-Belt" herringbone gear reducer book No. 1519A discusses applications of reducers, their design, selection data, service factors and types of reducers. Single reduction, double reduction and triple reduction types are shown. Use of reducer with roller chain drive is also covered. Horsepower ratings are given for various models.

28. Brazing Flux

Scaife Co.—2-page illustrated bulletin No. 314 on "Scaiflux 21" discusses characteristics and applications of this flux for production silver alloy brazing. Case studies on use of product are quoted.

29. Turning Rolls

Ransome Machinery Co.—2-page illustrated bulletin No. 188 covers turning rolls for facilitating welding of large cylindrical objects such as drums and tanks. Units are available for handling loads weighing up to 75 tons.

30. Insulating Varnish

Sterling Varnish Co.—4-page illustrated bulletin No. 143 is entitled, "Thermobonds, the New Insulation." Ten insulating mediums are adaptable for conditions in which they are subjected to excessive heat, heavy overloads and atmospheres carrying acid or alkali fumes and abrasive materials. Varnishes are applicable to high speed armatures, high cycle motors and heavy duty transformers.

31. Brushes

Hanson-Van Winkle-Munning Co.—15-page illustrated bulletin No. Br-103 is descriptive of line of brushes. Includes new section on "Staplbond Tampico" brushes and steel wire brushes. Among other brushes described are steel wire section, circular brass and steel wire scratch, bristle, goblet, satin finishing, plater's scouring, cotton potash and spiral wire ring brushes.

32. Tubing & Fittings

Weatherhead Co.—4-page illustrated bulletin is entitled "Installation Instructions for Weatherhead Ermeto Safety Fittings." Each step in assembly and disassembly is explained for these fittings which eliminate need for flaring, welding, threading or soldering.

33. Abrasive Belt Surfacer

Porter-Cable Machine Co.—32-page illustrated bulletin No. 630 is descriptive of precision "Wet Belt" machining method using abrasive belt surfacers for producing flat finished surfaces to tolerances of 0.0005 inch. Typical parts produced and procedure are described.

34. Open Hearth Equipment

Reliance Steel Products Co.—12-page illustrated catalog No. 12 describes water-cooled doors, standard and special frames, reversing and control valves, coolers and other products for open hearth and similar heating equipment.

35. Electronics

Westinghouse Electric & Mfg. Co.—44-page illustrated booklet No. B-3264 describes "Electronics at Work." Electronic applications in industry, war, home and medicine are shown and described. Various types of electronic tubes for such applications as industrial control, diathermy, power conversion, X-ray and radio are illustrated and primary use of each identified.

36. Punching Units

Wales-Strippet Corp.—8-page illustrated bulletin G is descriptive of "Wales" punching and notching die units which can be applied to standard press brake setups. Various types and sizes are shown and specifications given.

37. Tool Steel Welding Rod

Welding Equipment & Supply Co.—18-page illustrated bulletin describes use of "Eureka" tool steel welding wires for electric arc, atomic hydrogen and oxy-acetylene welding in composite construction and repair or reclamation of tools and dies. Rods are available in wide range of steels and alloys for specific applications.

38. Bending Rolls

Thomas Machine Mfg. Co.—4-page illustrated bulletin No. 127 describes horizontal and vertical angle bending rolls for bending angles, tees, flats, rounds, squares, pipe, beams, channels and special shapes. Four sizes of machines are made in capacities ranging from 1½ to 5-inch diameter pipe.

39. Diesel Engines

Worthington Pump & Machinery Corp.—12-page illustrated bulletin No. S-500-B36B explains design, operation and applications of direct injection, totally enclosed, vertical, four-cycle, type CC diesel engines. Using direct injection system, engines are rated at 56 horsepower per cylinder at 450 revolutions per minute.

40. Low Temperature Brazing

Handy & Harman—2-page regular issue No. 23 of "Low Temperature Brazing News" shows typical applications of "Sil-Fos" and "Easy-Flo" low temperature brazing alloys to parts for war materiel. Case studies are shown.

STEEL *Readers' Service Dept.*

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War Gives Tremendous Lift to Production of Alloy Steels

(*Concluded from Page 51*)

sary to convert some of the country's oldest, most antiquated open-hearth furnaces to production of alloy steels, and only recently a company operating such units received commendations from the War Department on the excellent quality of its product. The importance of this fact lies in its application to postwar markets. There are several major steel producers which have not yet seen fit to produce alloy steels. It is wholly possible these companies will get into the alloy steel business via their open hearths.

Electric furnace capacity as of Jan. 1, 1943 was slightly more than 4,500,000 net tons. Additional capacity under construction and to be completed this year totals roughly 1,750,000 net tons. Under the most favorable conditions the electric furnaces will produce less than 6,000,000 tons of alloy steel in 1943, which leaves a remainder of 8,000,000 tons to be produced in the open hearths.

No question is raised about the market for this 14,000,000 tons of metal so long as we have a war industry. The question is the other way round—how can that 14,000,000 tons be stretched to cover the needs? However, there will be a much different situation in the postwar period. During 1940, which was the last full-volume peace time year, less than 5,000,000 tons of alloy steel were produced.

One of the industry's major problems after the war will be the development of markets broad enough to absorb all the excess tonnage.

Undoubtedly some of the experience being gained in war production—particularly in aircraft—will be translated into better peacetime products. For example, the use of tubular alloy steel in making aircraft frames will probably be carried over into the automotive field.

The aircraft industry itself will be a prime consumer of alloy steels. Aircraft engines for war planes have provided the alloy steelmaker with some of his most difficult problems, and the answer to these problems can be translated into a thousand peacetime uses. Wherever there are difficult jobs for steel to do, the alloys may provide the answer. Turbosuperchargers provide a case in point, because this gadget supplies air under pressure for engines of high-flying planes under almost impossible conditions. The shaft, for example, carries two rotors—one in the exhaust line, which runs red-hot, and the other, only a few inches away, in temperatures as low as 75 degrees below zero.

One new tool which has received tremendous impetus from the war effort and which will play a large part in alloy steel uses afterward is induction heating and its applications. Fabrication costs on critical moving parts such as gears, cams, push rods and the like can be substantially reduced through proper application of this heat treating method. Close control, down to the fraction of an inch in dimension and to the last degree in temperature, is possible.

Much of this speculation on the place of alloy steels after the war is just gossip—wishful thinking, possibly, but wishful thinking of a constructive variety which is only one step from actuality. Through conservation is coming an entirely new conception of the rightful place of alloys. Used correctly, alloys can not only make the job easier, but they can also make it more economical. That's the answer we'll be looking for after the war, and that's the answer alloy steels can provide.

From coast to coast Industrial Brownhoist Cranes are doing a real job for America's war effort by speeding up material handling. On railroads, in chemical plants, in steel mills, in shipyards and big industrial plants, I. B. Cranes are using magnet, hook or bucket to load, unload and move material at top speed up to 24 hours a day.

If you are interested in handling more material with less man-power, it will pay you to operate I. B. Cranes. Industrial Brownhoist Corporation, Bay City, Michigan. District offices: New York, Philadelphia, Pittsburgh, Cleveland and Chicago.

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Airplanes, Aviation Engines, Aviation Carburetors, Airplane Parts, Engine Parts, Plastics, Rubber Products, Processed Fabric, Tanks, Tank Engines, Cold Strip Steel, Armor Plate, Forgings, Solvents, Motor Fuel, Electric Power.

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If you would like more information, write on your company letterhead for Bulletin 883.

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Steel Schedules Revised For Better Distribution

Deliveries halted where inventories are large. . . Pressing needs given released capacity. . . Bookings on most products into next year. . . Ore shipments at all-time high

DEMAND

Heavy in all lines.

PRODUCTION

At 98 per cent for third week.

PRICES

Ceilings hold firmly.

REVISION of mill schedules is under way as a result of the campaign by the War Production Board to distribute steel more equitably in relation to essential needs.

Inventories of consumers are being scanned and where they appear excessive mills are authorized to defer further deliveries until excess stocks have been drawn down. This releases capacity for other consumers in great need. As a result some claimant agencies have had orders deferred until they have reduced stocks on hand, including some bullet core wire in cases where inventories ran more than three months. A forging company in the Midwest is said to have cancelled 8000 tons of steel, equivalent to three months consumption. Released mill capacity is immediately filled by needs of other consumers for early delivery. This action is relieving the situation in many cases where war production was threatened by delay. WPB reports that the present effort has resulted in cancellations of 812,000 tons and not much more is expected.

This is not releasing more steel for civilian use and heavy bookings well into next year indicate there will be no early easing for this purpose. Steel requests for fourth quarter were 4,200,000 tons above supply for carbon bars and 250,000 tons for alloy steel.

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Sheet producers in general are booked solidly four to five months ahead but requests accompanied by allotment numbers are appearing for deliveries within a few weeks. Granting of allotment numbers indicates capacity exists somewhere for this early tonnage and where mills are unable to accept the order consumers have been urged to take the matter up with Washington, which knows where the tonnage can be handled. Some cases are reported where such help has been provided. A similar condition is met in plates.

Cold-rolled sheets are particularly extended and several producers have little unfilled capacity for the remainder of the year. One midwest mill is booked solidly into March on cold-rolled and has no open capacity for hot-rolled before January. Narrow cold-rolled strip mills are equally filled, many being booked through the year and some into February and March. A few contracts extend into June, 1944. Directives are appearing for specific monthly deliveries for definite use, including machine gun belt links.

Steel production last week held at 98 per cent for the third week. Pittsburgh regained another point to 100 per cent, Wheeling advanced 5 points to 94 as an additional open hearth was lighted and Cincinnati advanced 3 points to 89 per cent. A strike at Buffalo cut the rate there 7 points to 83 per cent. Chicago declined ½-point to 98 per cent, Cleveland 2 points to 94, St. Louis 3 points to 89. Rates were unchanged at Youngstown, 98; Birmingham, 95; eastern Pennsylvania, 93; New England, 97 and Detroit, 89.

Lend-lease and other exports of steel are expected to increase during third and fourth quarters, following the heavier movement during second quarter. Ingots and semifinished shipments will be up substantially in third quarter and finished steel products probably will be approximately twice as much as the raw steel. This includes considerable pipe, cold-finished bars and wire. Better shipping conditions in the Atlantic will favor a heavier shipment to the war zones and South America.

• • •

Tin plate producers are booked for almost their entire third quarter output and expect a larger output in fourth quarter than in the same period last year. In the final quarter of 1942 government restrictions held production to a low point, in some cases 20 per cent of capacity. This year schedules are more generous and include considerable material for lend-lease, estimated at about 40,000 tons, principally for Great Britain and South America, considerably more than was allowed a year ago.

Iron ore movement on the Great Lakes made a new high monthly record in July with 13,588,814 gross tons, compared with 13,405,506 tons in the corresponding month last year. Cumulative tonnage to August 1 is 8,974,968 tons less than in the comparable period in 1942, limiting probability of the season's total exceeding that of last year. However, additional carriers will be put in service during the remaining months of navigation, which will increase the volume carried. Approximately half the ore season has passed and unless movement is much greater in the remaining months the quota will not be reached.

Office of Price Administration ceilings ruling, average composite prices of steel and iron products continue unchanged, finished steel composite at $65.73, semifinished steel $36, steelmaking pig iron, $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Aug. 7	July 31	July 24	One Month Ago July 1943	Three Months Ago May, 1943	One Year Ago Aug., 1942	Five Years Ago Aug., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$58.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.60
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	19.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	14.55

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	Aug. 7, 1943	July, 1943	May, 1943	Aug., 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.48	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	Aug. 7, 1943	July, 1943	May, 1943	Aug., 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.38	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.39	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.46	140.65
Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting, steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.50	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncropped, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36; Duluth (bil.) $36.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets only, $42.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O.

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section: 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over, $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, Galveston, No. 5—9/32 in., inclusive, per 100 lbs., $2. Do., over 9/32—47/64-in., incl., $2.15.
Worcester add $0.10; Pacific Ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Eastern Mich. 2.25c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Detroit del. 2.85c; Eastern Mich. 2.90c; Pacific ports 3.40c.

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Detroit del. 3.45c; Eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	....
65	7.15c	7.90c	....
58	7.65c	8.40c	....
52	8.45c	9.20c	....
U.S.S., R.C. Grade	10.10c	.....	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c;. Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.45c; Eastern Mich. 3.50c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb.. 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15 00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c. (Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth):

Bright basic, bessemer wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.55; Pacific ports	3.05c
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland	3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland	3.40c
Woven fence, 15½ gage and heavier, per base column	.67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Pipe, Tubes

Welded Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	⅝	30	10
½	63½	51	1-1¼	34	16
⅝	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.04	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.

Supplies: Track bolts, 4.75c; do. heat treated, 5.00c. Tie plates, $43 gross ton, base.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	..	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	26.00	34.00	41.00	29.25	38.00
†347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. ** Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

	U.S.S	S.A.E.
Semifinished hex.	62	64
⅞-inch and less	59	60
1-1-inch	57	58
1⅛ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.60
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943.
†$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	...	...	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.68	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	...	...
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60% $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard): 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $10.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33. Ferromanganese (low and medium carbon): eastern zone, low carbon, bulk, c.l., 23c, 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c, 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, bulk, c.l., 79.50c, 2000 lb. to c.l., 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 12c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c —low carbon, eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr.

Briquets: Ferrochrome, containing exactly 2-lb. Cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 to c.l., 8.75c; silicomanganese briquets, containing exactly 2 lb. manganese and ¼ lb. silicon, bulk, c.l., 5.80c, 2000 lb. to c.l., 6.30c; ferrosilicon briquets, approximately 5 lb. and containing exactly 2 lb. of silicon, or weighing approximately 2¼ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, ferrochrome, .3c for c.l. and .5c for 2000 lb. to c.l.; silicomanganese, add .25c for c.l., and 1c for 2000 lb. to c.l.; ferrosilicon, add .15c for c.l. and .40c for 2000 lb. to c.l.; western, ferrochrome, add .70c for c.l. and 2c for 2000 to c.l., silicomanganese, add .55c for c.l. and 2c for 2000 lb. to c.l., ferrosilicon, add .30c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk, c.l., 6.65c and 2000 lb. to c.l., 7.85c; central, 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 97% and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicomanganese: Max. 1.50 carbon, bulk, c.l., eastern zone, 6.05c, 2000 lb. to c.l., 6.70c; central, add .25c and 1.00c; western, .55c and 2.00c; f.o.b. shipping point, freight allowed; all prices per pound of alloy.

Manganese Metal: 96 to 98% manganese, max. 2% iron, eastern zone, bulk, c.l., 39.60c, 2000 lb. to c.l., 40c; central, 39.85c and 41c; western, 40.15c and 43.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 35.60, 2000 c.l., 36c; central, 35.85c and 37c; western, 36.15c and 39.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium: ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium Alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 9.50c; ton lots 10.00c, less ton lots, 10.50c.

Borosil: 3 to 4% boron, 40 to 45% si., $7 lb. cont. Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Coldrolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[24]	4.144[21]	4.715	7.762[20]	6.062[20]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[24]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[24]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[12]	4.872[25]	4.072[21]	4.772	7.566[20]	5.866[20]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[25]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[16]	4.40[10]	3.75[21]	4.66	7.35[20]	5.65[20]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.81[1]	4.65[16]	4.30[10]	3.65[21]	4.35	7.35[20]	5.65[20]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	.....	7.45[20]	5.75[20]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45	7.556[20]	5.856[20]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[22]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.800[21]	4.659	7.680[20]	5.980[20]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[16]	5.443[24]	4.443[21]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[16]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[16]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[13]	4.20[24]	3.75[21]	4.65	5.75[20]	5.85[20]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.85[13]	4.10[24]	3.65[21]	4.55	5.75[20]	5.85[20]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[13]	4.337[24]	3.887[21]	4.787	5.987[20]	6.087[20]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[13]	4.568[24]	3.98[21]	4.78	6.08[20]	6.18[20]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[13]	4.46[24]	4.361[21]	5.102	6.09[20]	6.19[20]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[13]	4.347[24]	4.031[21]	4.931	6.131[20]	6.231[20]
Memphis, Tenn.	3.90[3]	3.95[3]	3.95[3]	5.71[3]	3.85[3]	4.10[3]	4.10[3]	5.25[13]	4.66[24]	4.31[21]	.....	.....	.....
Birmingham (city)	3.50[3]	3.55[3]	3.55[3]	5.83[3]	3.45[3]	3.70[3]	3.70[3]	4.75[13]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham (country)	3.40[3]	3.45[3]	3.45[3]	5.83[3]	3.35[3]	3.60[3]	3.60[3]	4.75[13]	4.78[24]	4.43[21]	.....	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[13]	4.95[13]	4.60[21]	5.00	.....	.....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[13]	4.95[13]	4.60[21]	.....	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.75[3]	4.30[3]	4.30[3]	5.25[13]	5.43[13]	4.50[21]	.....	.....	.....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[13]	7.15[4]	5.70[21]	.....	9.55[20]	8.55[20]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[13]	7.55[13]	5.55[21]	.....	9.80[9]	8.80[9]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[13]	7.45[13]	5.45[21]	.....	.....	.....
Tacoma	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.70[6]	6.63[24]	5.75[21]	.....	.....	.....
Seattle (city)	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.35[6]	5.45[6]	5.70[6]	6.63[24]	5.75[21]	.....	.....	8.00[9]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in amendments Nos. 10 to 16 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base.

Ores

Lake Superior Iron Ore
Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80
less $7 freight allowance	

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per G T	Bars per 100 lb.	Billets per G T
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	.....	.....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.13-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	.....	.....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

	ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES													
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Foundry Steel 2 ft. and less	Foundry Steel 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 14.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 13.50c; No. 12 foundry alloy (No. 2 grade) 13.50c; chemical warfare service ingot (92½% plus) 13.50c; steel deoxidizers in notchbars, granulated or shot, Grade 1 (95-97½%) 13.75c, Grade 2 (92-95%) 13.50c, Grade 3 (90-92%) 13.00c, Grade 4 (85-90%) 12.50c; any other ingot containing over 1% iron, except PM 754 and hardeners, 13.50c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62½c; Grade D, 99.0-99.74% incl. 51.12½c; Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.50c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 138

Despite the fact that most sheet producers are now booked solidly four to five months ahead on hot and cold-rolled grades, they report that they still are in receipt of requests, duly accompanied by allotment numbers, for tonnage for delivery within a few weeks. In New York several requests have been noted since the first of the month for tonnage for shipment in August; still others for delivery in September. What finally becomes of these requests, the sellers approached do not seem to know, but theoretically, at least, if an allotment number is issued to a claimant agency by Washington there is capacity for that tonnage somewhere in the country within at least a limited period beyond the month in which shipment is requested.

It is considered probable, as has been the case only in recent weeks, that some of this tonnage, if not all, is worked in somewhere as a result of certain cutbacks or other readjustments in schedule. However, over the past month or so, particularly the past fortnight, there have been little in the way of cutbacks or cancellations.

At present deliveries have become particularly extended in cold-rolled sheets. Several producers have little or nothing to offer over the remainder of this year and in at least one instance a midwest producer is booked up solidly into March. Incidentally, this producer has no hot-rolled tonnage available before January and most of that month's production is scheduled. Certain other producers of hot-rolled sheets are in almost as tight a position, although it is still possible for a consumer to get tonnage in December and perhaps by careful shopping around, in November.

Galvanized sheet deliveries are still obtainable in October in some instances, although schedules on this material are also tightening.

A new trend in war demand is met in the Cincinnati area, call for enameling sheets increasing recently. This is not taken as an indication of relaxing controls on civilian goods but greater emphasis on certain war needs. Sheetmakers in that district are well sold for the remainder of the year, except for galvanized, which can be obtained for almost any delivery after September.

Heavier gages lead sheet demand in New England and warehouse stocks are not as well balanced; galvanized is not active and some jobbers are well stocked, although the heavier warehouse load directive is effective for scattered September deliveries. Some are not taking full advantage of the increase. Deliveries are extended into January on some grades, and, while demand in the northeast area is not unusually heavy, shipbuilding excepted, miscellaneous fabricators without long-range program contracts have difficulty in getting tonnage before late fourth quarter. On the whole, warehouse replacement deliveries are better than the average.

With narrow cold strip mills in the East booked solid through the remainder of the year and some into February and March, forward buying under CMP actually has extended into June, next year, although not all capacity is taken up to that period. This advance buying is causing some concern. Directives are also appearing for production of specific tonnages each month for definite use, one covering .50 caliber machine gun belt links which account for heavy strip tonnage. Production directives on high carbon are filed six months ahead with some mills. Substantial quantities are also taken for stop nut parts required in large volume for aircraft assembly and for aircraft hardware. Carbon steel strip has been substituted for stainless bars for one part which is drawn and drilled, whereas the unit was formerly machined from bars. Saving in weight per 1000 units is 62½ pounds, compared with 285 pounds, and scrap 24½ pounds, against 62½ pounds.

Plates . . .

Plate Prices, Page 139

The sold-up condition of plate mills is forcing heavier demands on jobbers. Most plate producers are booked up over the remainder of the year and this leaves fabricators in a bad spot for urgent tonnage, confronted with certain shifts in their schedules and ship repair yards also affected, their requirements fluctuating considerably from time to time. In certain of these cases jobbers are the only ones to which they may turn and the latter are not in as good a position to help that they were recently, as their stocks have been shrinking.

Recently there has been an expansion in pontoon requirements; also in de-

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mand for steel plates for "tank busters". Locomotive builders are stepping up their specifications appreciably.

Some plate mill capacity is tentatively reserved to meet revisions in the shipbuilding program involving the change from Liberty to Victory ships. The latter will require new sizes, shapes and equipment, necessitating slight changes in plate requirements, which will be heavy. To avoid delays in rolling material for the new type, the Maritime Commission, now completing plans, will utilize reserved capacity on the earliest possible schedule. Meanwhile all mills are heavily engaged on other tonnage. The advent of Victory ship requirements, however, will result in some changes in schedules for the mills reserved. In New England one large shipyard has its Liberty ship schedule filled and is subletting heavily; 152 ships are involved.

Pipe . . .

Pipe Prices, Page 139

Most merchant pipe sellers are booked up for the current quarter on lap weld, although they can still take some butt weld tonnage for shipment before the end of September. Lap weld shipments are the tighter of the two, it is said, not only because of more limited production facilities but because of a continued good movement abroad. New York distributors appear to be in a comfortable position on both grades, particularly butt weld. In fact, some have heavier stocks than they anticipated a month or so ago, as building construction and maintenance have not been up to their expectations.

Demand for merchant pipe, butt and lap weld, from usual leading users is light, but for shipbuilding, prefabrication and miscellaneous industrial requirements substantial tonnages are needed. For the expanding high-octane gasoline and synthetic rubber facilities considerable pipe and tubing is still bought, but the peak appears to have been passed for the current programs. Merchant pipe deliveries are mostly in October, although some capacity is open for September.

Most distributors in the New England district, where shipyards demand leads, are within 90 days on inventories and there is some scattered shading of secondary prices in the East. Of tubular products small-size cold-drawn seamless is the tightest; most production is booked far ahead for aircraft and a leading producer has orders into March. Aircraft sizes of electric welded tubing are also tight.

Plumbing and heating jobbers are taking little volume. In prefabrication of pipe there is more cold bending of larger sizes than is the usual practice. Wrought pipe buying is slower and distributors in some instances are not specifying full quotas. In salt water lines on Liberty ships about five tons of wrought pipe are required per ship.

Wire . . .

Wire Prices, Page 139

Wire mill schedules on some products are being revised and adjusted to meet stop orders on deliveries ranging up to three months or more where inventories have been found excessive. This is opening some capacity for shipment earlier than first scheduled. More excessive inventories have been discovered than expected. Included are some stocks of bullet core steel and new deliveries will be halted in some cases until inventories are reduced to under 90 days.

Directives on bare welding wire for September are down also, but this is due to vacations in processing shops rather than a cut-back. Demand for welding wire continues heavy and production this year will set another record, around 550,000 tons. The trend toward use of heavier coated material with more base metal is pronounced; also the shielded arc type.

Distribution of rods covers a wide range of consumers; demand for heavier stock for nuts and bolts is substantial. Screw manufacturers are buying both rods and finished wire. Deliveries on low-carbon coarse wire have lengthened with some mills, into late September. Demand for specialties is heavy and galvanized fine wire has also tightened. Buying of brush wire has flattened with some cancellations.

Rope mills continue to take large tonnages of high-carbon wire and are sold well into next year, with large additional contracts recently placed. For the most part excess inventories of wire products center in ordnance producing plants. service procurements and other users heavily engaged on war equipment.

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Tin Plate . . .

Tin Plate Prices, Page 139

Tin plate producers are now virtually booked up to the end of this quarter, and anticipate substantially better fourth quarter business than in the corresponding period last year. In fourth quarter of 1942, due to various governmental restrictions on use of steel for tin plate, some producers had practically to close down for several weeks and tin plate production generally did not average much over 20 per cent during that period, it is said. As a result, producers had difficulty keeping their organizations intact.

This year the government is providing for better operating schedules in fourth quarter and as one measure will permit rolling of more tonnage for lend-lease. According to latest information, although it may not be final, approximately 40,000 tons of tin plate will be rolled for shipment abroad, principally to the United Kingdom but with a fair portion for South America. Such a figure would compare with about 25,000 tons in the current quarter.

Rails, Cars . . .

Track Material Prices, Page 139

While two freight car awards were reported in July, both of these had actually been placed earlier in the year, 50 for the Pittsburgh & Shawmut having been closed in June and 500 for the Chicago & Alton in May. Consequently actual awards in July were lacking so far as can be ascertained at present.

Better business in August may develop should the War Production Board decide to allot steel for fourth quarter for several thousand cars. Decision in this matter may be announced within the next few days.

Due to revisions, domestic freight car awards in the first seven months amounted to 12,670, as compared with 24,030 in the corresponding period of last year, 101,234 in the same period of 1941 and 21,019 in the first seven months of 1940. Further comparisons follow:

	1943	1942	1941	1940
Jan.	8,365	4,253	15,169	360
Feb.	350	11,725	5,508	1,147
March	1,935	4,080	8,074	3,104
April	1,000	2,125	14,645	2,077
May	870	822	18,630	2,010
June	50	0	32,749	7,475
July	0	1,025	6,459	5,846
7 mos.	12,670	24,030	101,234	21,019
Aug.	....	0	2,668	7,525
Sept.	....	1,863	4,470	9,735
Oct.	....	0	2,499	12,195
Nov.	....	0	2,222	8,234
Dec.	....	135	8,406	7,181
Total	....	26,028	121,519	65,889

Pig Iron . . .

Pig Iron Prices, Page 140

With some clarification with respect to barge rates and somewhat more barge capacity now available, at least temporarily, pig iron has recently been received at tidewater by way of barge from the Buffalo area. The tonnage moved thus far has been relatively small, however, and there is no effort to stock iron at tidewater as has been the case in normal times. In fact, one drawback has been the difficulty of accumulating enough extra iron at the furnaces to make barge shipments and the difficulty at the other end in having to wait for such iron. Even though some shipments are now finally being made, the New York trade does not anticipate any great movement this year through the canal.

Meanwhile, there has been a leveling off in the downward trend in consumption of pig iron in the New York area, noticeable for at least three months. In fact, August consumption will in all probability be heavier than during July, at which time the melt was affected by suspensions during the July 4 holiday week, for vacations and inventory taking.

MRC Helps Mystic Meet Added Pig Iron Costs

The $2 premium permitted Mystic Iron Works, Everett, Mass., and absorbed by consumers, far from covers increased production costs burdening that furnace under war economy. That OPA recognizes this is indicated by further provision for compensation to be recovered through the Metals Reserve Co., reported to be $1 per ton additional. In effect Mystic's production will be purchased by MRC, the iron company acting as agent, with distribution allocated through the usual channels. Costs have increased upwards of $10 a ton, ore purchased at Buffalo approaching $4.16 a ton higher than its normal supply, because of freight.

Foundries in New England are also confronted with rising costs other than on pig iron and some pressure against

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Higher iron price is evidenced by increased applications for Buffalo iron. Under the present setup, however, WPB is not likely to permit the Everett furnace to produce iron for stockpile and current production is being distributed despite some resistance to price. Foundries are selling their castings at ceiling prices, but may ask individual relief; a precedent bearing on procedure would be created should a consumer refuse delivery on higher priced iron and hold out for material at regular base quotations.

Scrap . . .

Scrap Prices, Page 142

In general the situation in steel and iron scrap is easy as to current supply, a few allocations serving to distribute tonnage where most needed. Collections are tight and preparation in commercial yards is handicapped by labor shortage but industrial supply is steady. Concern continues in some areas as to supply later in the year and in some cases reserves built up last spring are being reduced.

Movement of scrap in the Chicago district continues on the down grade in spite of all efforts to arrest the trend. While some consumers may be laying down inventory, tonnage cannot be large. Even industrial scrap, which up to now has remained fairly steady, is declining, indicative of completed or curtailed war contracts. Turnings and borings, for example, constitute nowhere near the problem of recent months. Railroad material is falling off, and dealers supplies are meager. Although WPB officials met with auto wreckers in Chicago a few days ago to produce a better understanding of order M-311 forbidding sale of usable parts, but little was accomplished.

Shipyard and plant scrap make up most of open-hearth steel moved in New England with tonnage reaching dealer yards below normal. Shipbuilding material and carbon grades are absorbed as produced, considerable by allocation to outside furnaces and some to points where the delivered price is slightly over the ceiling. Demand for low phos has slackened slightly, but the main problem is disposal of mixed alloy turnings and borings, which are accumulating at some plants. Numerous metalworking shops are producing these in larger quantities than ever before. Railroad offerings are light and what comes out is allocated. Supplies of automobile scrap are dwindling, although unsold tonnage of unstripped motor blocks is substantial.

Open-hearth scrap, including low phos grade, again is being allocated from the New York district for delivery in the Youngstown area. For several months little material has been moved to the Valley, where delivered prices are over the ceiling because of freight charges from the eastern seaboard. Heavy melting steel and low phos are moving to Canada by barge to Buffalo or Fort Erie, Ont. and thence by rail to Hamilton. Much shipyard scrap is returned direct to the supplying steel mill, by allocation. In the East some customers have held up delivery of low phos.

St. Louis district consumers continue to cut deeply into reserves and considerable anxiety is felt about late summer and fall supply. Labor shortage is felt sharply by commercial yards and country dealers.

Collection of scrap other than industrial in the Cincinnati district is tapering, dealers receiving less than normal and processing less because of labor shortage. Shipments meet immediate needs of melters and little fear is expressed over future supply.

July Ore Sets Record But Season Total Short

Iron Ore Prices, Page 141

Shipments of iron ore by the Great Lakes made a new high monthly record in July, with 13,588,814 gross tons, according to the Lake Superior Iron Ore Association, Cleveland. This compares with 13,405,506 tons moved in July, 1942, a gain of 183,308 tons. In June tonnage moved totaled 11,864,401 tons.

In spite of this gain, tonnage shipped for the season to August 1 was still 8,974,968 tons short of the total to the same date in 1942. Cumulative total for this year to August 1 was 38,382,704 tons, compared with 47,357,672 tons to the same date in 1942.

July shipments were hampered by fogs at the Soo, slowing progress of cargoes, and the month's total was about 500,000 tons less than had been expected. However, July was the first

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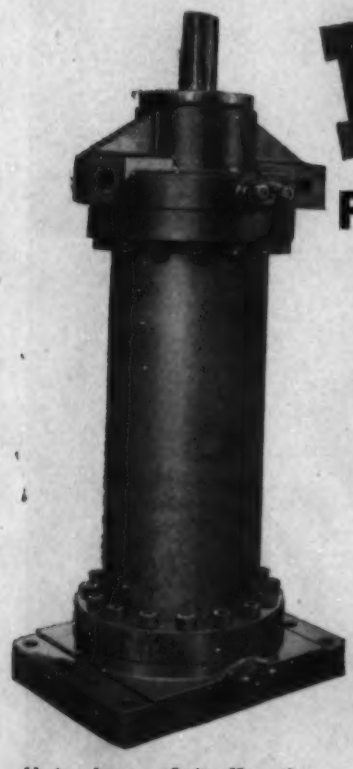

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month in which the movement exceeded the corresponding month last year. August usually is the peak for the season and addition of more carriers during the latter part of the season gives promise of a heavier movement from now to the end of navigation.

Details of July loadings are as follows:

	July, 1943	July, 1942
Escanaba	905,509	740,256
Marquette	643,756	543,019
Ashland	881,695	919,777
Superior	4,577,711	4,895,737
Duluth	3,357,291	3,559,143
Two Harbors	3,157,351	2,675,917
Total, U. S.	13,523,313	13,333,849
Michipicoten	65,501	71,657
Grand Total	13,588,814	13,405,506

Increase over year ago, 183,308 tons.

Cumulative loadings to August 1 are as follows:

	To Aug. 1, 1943	To Aug. 1, 1942
Escanaba	2,910,170	3,330,195
Marquette	1,896,145	2,610,753
Ashland	2,659,748	3,615,722
Superior	13,175,636	16,994,052
Duluth	9,052,979	11,597,480
Two Harbors	8,505,387	8,947,362
Total, U. S.	38,200,065	47,095,564
Michipicoten	182,639	262,108
Grand total	38,382,704	47,357,672

Decrease from year ago, 8,974,968 tons.

Domestic Iron Ore Output 118,189,336 Tons in 1942

Production of usable iron ore in the United States in 1942 totaled 118,189,336 net tons, according to the Bureau of Mines. Output of crude ore was 141,710,416 tons and shipments were 142,010,365 tons. Of this quantity 49,936,613 tons were shipped to beneficiation plants and 92,073,752 tons direct to consumers. A total of 25,917,959 tons of beneficiated ore was produced at milling plants, in addition to 720,172 tons of byproduct cinder and sinter from the pyrite industry. Output in 1942 came from 252 mines, of which 35 mined over 1,000,000 tons of crude ore each. Seventeen states were active producers in 1942, compared with 20 in 1941. Minnesota, with 82,809,939 tons, provided 70 per cent of the usable ore and Michigan, with 17,499,060 tons, was second, with 15 per cent. The Lake Superior area provided 86 per cent of the domestic output. About three-fourths of ore mined in 1942 was from open-pit mines.

Shipments of usable ore from mines totaled 118,707,133 net tons, 91,972,925 tons, 77 per cent, being direct shipping ore for iron and steel furnaces. Cement manufacturers received 74,036 tons, paint manufacturers 29,424 tons and miscellaneous users 34,842 tons.

Refractories . . .

Refractories Prices, Page 140

Refractory manufacturers are able to maintain shipments both for new construction programs and maintenance work without difficulty. A considerable amount of material for the new plants already has been shipped although some is still pending for western units.

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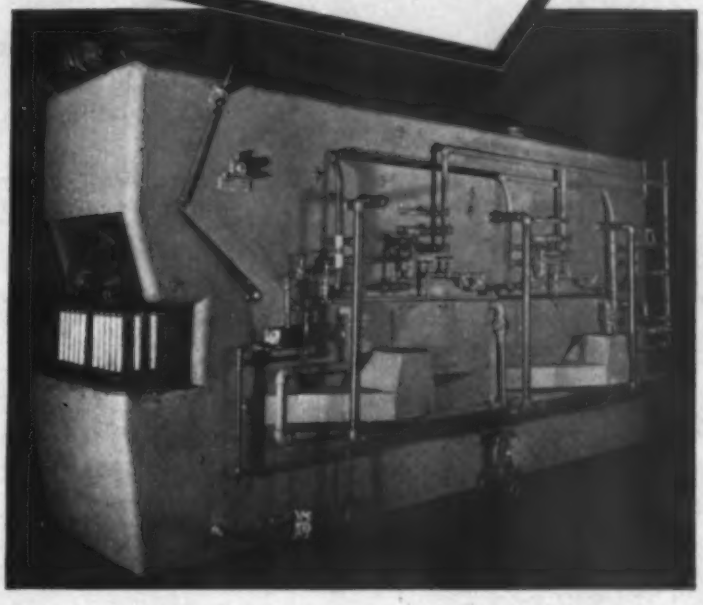

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ments several months in advance. This factor and effective mobilization of manpower have contributed to the recent time records in relining jobs.

Refractory manufacturing capacity has been increased about 20 per cent since the start of the war, although there has been no shortage at any time.

Export market is as active as shipping conditions permit, with substantial quantities going to South America and some to the Middle East. Manufacturers believe demand from foreign countries will increase considerably after the war.

Warehouse . . .

Warehouse Prices, Page 141

Sales of steel by warehouses are holding at a substantial level, intake of material is satisfactory, and stocks are better balanced. Probably it will be impossible to obtain complete balance under current conditions, but the situation is far better than the scarcity which existed a few months ago. Distributors see a gradual shift in demand away from ordnance to aircraft and ships. This trend is in keeping with the new emphasis which is developing generally as the war progresses to invasion activities.

Steel in Europe . . .

London — (*By Radio*) — Demand for special steels for aircraft and munitions works is increasing in Great Britain as war output is expanded. Semifinished supplies to rerollers are sufficient and include some material from the United States. Supply of heavy structurals is easier but plates are tight as shipbuilding and other war demand is undiminished.

Pacific Coast . . .

Seattle — Three Oregon and Washington shipbuilding firms are reported to have been awarded additional navy contracts for construction of more than 200 small fighting craft, involving approximately 150,000 tons of steel. These craft include sub chasers, mine sweepers, PT boats and AVT subchasers. They are intended both for the U. S. Navy and Allied Nations under lend-lease arrangements. The building firms participating are the Albina Engine & Machine Works and Willamette Iron & Steel Co., Portland, Oreg., and the Associated Shipbuilders, Seattle. These yards have been engaged almost exclusively in war work for the past two years.

A government plant to be built in Washington state by du Pont for war work is reported to require about 15,000 tons of steel, which has been awarded to a Mid-West interest.

The Renton plant of the Pacific Car & Foundry Co. has been ordered to cease building army tanks by Jan. 1 in order to turn its production to other war production of a secret nature. This plant has been converted and greatly enlarged to turn out the General Sherman 32-ton tanks, which fact was recently released by army officials. The nature of the new operations was not revealed in the statement by President Paul Pigott and Col. K. B. Harmon, ordnance chief for the western states.

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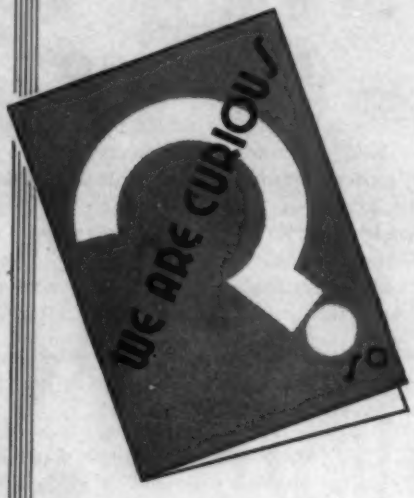

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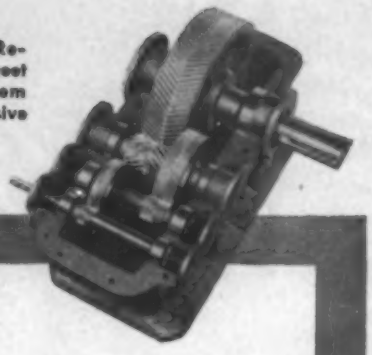

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government's interest in Plant No. 2 and the administration building for a sum reported as $7,767,363. No. 2 plant was financed by the government during the early war period and thus it obtained about a half interest by progressive investments. This development indicates Boeing's intention to prepare for permanent production following the war, planning to expand its manufacturing lines possibly to include various items from kitchen cabinets to automobiles, with complete facilities for meeting the demand for modern planes.

Tacoma is considering bids for furnishing two new diesel locomotives for the tideland railroad lines, delivery being an important factor. General Electric, bidding $55,784, offered the quickest delivery, 80-85 days.

Under a federal appropriation bill, it is expected that $100,000 will be allocated for exploration of potential iron deposits in Oregon. Several likely areas are awaiting survey, as well as the Oregon beach fields, reported rich in certain minerals.

Lend-Lease Shipments Heavier in Second Half

Lend-lease shipments of steel are expected to increase in the current half, as activities increase further in the European zone in particular and as the shipping situation becomes easier.

Ingot and semifinished steel shipments will be up substantially in third quarter and should at least be sustained in the fourth, according to leading trade opinion. In the first quarter semifinished shipment were practically negligible, but in the second quarter there was a spurt which has continued through and will account for a heavier movement during the current three months.

However, it is pointed out, the movement of finished steel products, which has been well sustained, will account for twice as much tonnage in third quarter as ingots and semifinished. This finished steel includes notably pipe, cold-finished bars and wire.

Shipments to South America have increased appreciably this year, after a slow start. With the improvement in ocean shipping there should be further gain over the remainder of the year. According to some trade estimates, South American shipments will range this year between 750,000 and 1,000,000 tons. South American shipments are mainly finished products, especially tin plate, pipe and wire.

Canada . . .

Toronto, Ont. — While the volume of steel orders placed in July fell below the record of the two or three months preceding, bookings as a whole were at a steady rate, and on such materials as plates, sheets and bars exceeded production tonnage, thus extending mill backlogs. Actual consumption of steel in first half, however, was below the high record of the preceding six months, largely the reflection of change-over in war materials production and curtailment in shell and certain type of gun output. C. D. Howe, minister of munitions and supply, stated that the war is 80 per cent over, which might be taken to indicate that this country, in the remaining 20 per cent

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AVONMORE, PA

of the fighting period, will center production on more specialized types of war supplies.

Plate mills are at maximum capacity, with backlogs to the end of the year. While plate orders have been in sufficient volume to extend well into 1944, it is stated that much of the business is being held up by the steel controller and is being placed from time to time so as not to cause too great a load of unfilled tonnage. In addition to the steady flow of plates for shipbuilding and armor plate for tank builders, supplies continue to be made available in increasing tonnage to essential civilian users.

Bar sales are fairly steady but the market lacked much of the interest that prevailed earlier in the year. Mill representatives state that demand is absorbing all output of both carbon and alloy bars, and while the heavy buyers of the first quarter have been replaced by another group of war consumers for quick delivery and big tonnages, there has been no decline in over-all demand.

Scrap iron and steel receipts have declined and a number of dealers now are almost cleaned out of yard stocks. However, there has been no severe drop in deliveries to consumers, although there may be soon unless there is speedy betterment in new offerings from war plants and outside points. Supply of cast scrap and stove plate has fallen below consumers' requirements and some melters report difficulty in obtaining supplies. Turnings and borings are in good supply, but there is no surplus of heavier steel materials.

Nonferrous Metals . . .

Nonferrous Prices, Page 143

New York — With the view of minimizing interference with war production schedules, copper and copper-base alloy products uncovered by the Copper Recovery Corp. are made available to manufacturers producing essential civilian goods. Disposal of this scrap to war plants might tend to delay some schedules with labor shortages a factor in refineries and brass mills. Some of the scrap may relieve the pinch with utilities.

Routing of idle or excess material into civilian channels is a temporary procedure for the expeditious disposal of the scrap and indicates no relaxation in the overall tight controls on the use of copper and its alloys. Approximately 5000 tons of brass and copper are available for manufacture of household ware, clocks and a limited list of permitted civilian goods.

Some of the stocks are usable in present form, but a substantial volume is likely to be remelted. The material will be purchased from the owners, the CRC acting as agent in disposal. For September allocations of copper, brass and wire mills will file a new form; while more detailed breakdown is required, the form is simplified in many respects and consolidates three used previously. The deadline was extended to Aug. 10 for filing; this was done previously on the fifth of each month, but some of the larger consumers have been late in filing. Under the new policy allocations will continue to be made around the 15th of each month.

Claimant agencies have filed for more copper than is available for fourth quarter and applications will be trimmed down to fit prospective production. This was the case this quarter. More consumers with large scrap holdings are getting less new copper each month, some half that obtained earlier in the year. Despite the large volume of scrap available, which is a mounting factor in allocations, the overall distribution of metal each month holds, indicating the end use of copper and copper-base alloys for war work is broadening. However, production at the mines is hampered by labor shortages which also adversely affects mills and fabricators. In Connecticut a manpower campaign for 15,000 more workers in the valley is projected.

There is little pressure for zinc with all essential war requirements easily met. Prime western production is well taken up, although tonnages, notably high grade, are available for the reserve supply. Zinc scrap is also in good supply. Endorsed allocations thus far this month are below those for July. Manpower shortages at the mines continue to keep the ore supply tight.

Sellers of aluminum scrap under contracts entered into before June 23 have been given an additional 30 days in which to deliver material under the contracts at the old higher maximum prices in effect before that date. On June 23 maximum prices for aluminum scrap and secondary alumium ingot were reduced approximately one cent a pound. Sellers of scrap under contracts entered into before that date, however, were permitted to continue to make deliveries under the contracts until July 23. Congested conditions at the smelter's plants have made it difficult for dealers to complete shipments in the time previously allotted and, therefore, OPA authorized scrap sellers to continue to make deliveries until Aug. 23, under contracts made prior to June 23 at former prices.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

100 tons or more, six bridge cranes, ordnance plant, Pocatello, Idaho, to Harnischfeger Corp., Milwaukee, $189,950, and Judson Pacific Co., San Francisco, $76,000, spec. 11518 Bureau of Yards and Docks, Navy Department.

REINFORCING BARS . . .

REINFORCING STEEL PLACED

625 tons, superstructure, low-lift pumping station and chemical building, South district filtration plant, Chicago, for department of public works, to Bethlehem Steel Co., Bethlehem, Pa.; S. N. Nielsen Co., Chicago, contractor; bids May 12.

250 tons, airplane propeller plant, A. O. Smith Corp., Milwaukee, to Worden-Allen Co., Milwaukee; Huntzinger Construction Co., Milwaukee, contractor; bids July 22.

RAILS CARS . . .

LOCOMOTIVES PLACED

Louisville & Nashville, six freight locomotives, to Baldwin Locomotive works, Philadelphia.

Northern Pacific, eight steam locomotives, to American Locomotive Co., New York.

Spokane, Portland & Seattle, two steam locomotives, to American Locomotive Co., New York.

Erie, six 5400-horsepower electric locomotives, to Electro-Motive Corp., La Grange, Ill.

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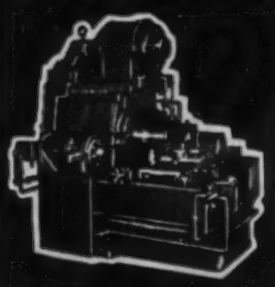

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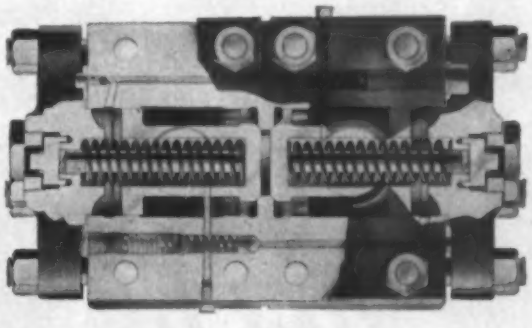

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Production Engineers Turn Energies to Postwar Problems

Research aimed at high production and low cost. . . : New metals and materials pose problems. . . Aircraft continues largest buyer. . . Tool builders doing more war subcontracting

Boston—With pressure for production easing, engineering staffs are resuming more normal functions in the machine tool industry. Here and there engineers are compiling factual data accumulated from war production experiences, pioneering new designs for tools cutting new metals and materials, with high production and low cost the ultimate goal. While this postwar thinking is retarded by uncertainties surrounding the industry, the trend grows and a few machine builders have engineers embarked on designs for new tools for postwar production. Too often overlooked is the fact rapid and efficient tooling for war in the space of 18 months was made possible by engineering progress made in the lean pre-war years in research and experimental development which did not halt during the dull years.

The aircraft industry continues to supply most new orders, notably special-purpose tools, some of which are still tight, including gear cutters and grinders. In other directions orders are for one or two machines, placed after the inquiry is passed by the regional office of the WPB, which first attempts to find a suitable tool to do the job within 10 days after the inquiry. Shipments are falling at an accelerated rate, reflecting declining backlogs.

More Subcontracts Taken

Meanwhile, more subcontracts for miscellaneous work are partially filling machine shop capacity, but not without some backing and filling growing out of revisions in production programs. Bottlenecks developing for certain parts and products are frequently eased by awards to machine tool builders. New England shops are now engaged on turbines, torpedoes, gear blanks and aircraft engine parts. A contract is sometimes lost or revised after much engineering detail is given the project for a basis of quotations, but the broadening range of work available is apparent. At this stage, however, work that will fit into present capacity is the more desirable, rather than that which requires additional tooling or radically new practice. To mesh into fast-moving and changing production schedules, time is too short for more tooling and new practices.

Although cutting tools and grinding wheels are tight, deliveries on some of the former are slightly improved with demand heavy and sustained. While some producers of high-speed end mill cutters with tang end now quote 60 to 90 days, deliveries by New England shops range from three to six months; high-speed steel chasers, 155 days; taper shank countersinks, 10 months; ground thread high-speed steel hand taps, 48 days. These are for New England shops; deliveries by producers in most other areas are somewhat better. National Twist Drill & Tool Co., Rochester, Mich., has been awarded substantial contracts, navy purchasing, New York, for cutters, chucking reamers, drills, counter-bores and other cutting tools.

New York—As machine tool orders and shipments continue to skid, the latter at a more rapid rate, with backlogs dwindling, the industry's future becomes more confused with the matter of renegotiation of contracts, final disposal of government-owned tools and DPC capacity in the foreground. Until these important problems are settled or more progress made in clarifying them, the outlook will continue murky, tinged with growing pessimism. New orders began declining late last year, but shipments held up during first half; now both are falling, while backlogs of some types of general purpose tools are nearly depleted.

DPC Investment Large

Investment of the Defense Plant Corp. in machine tool capacity is estimated at close to 50 per cent, but government-owned facilities for the production of some tools are much larger than others; in lathes and milling machines government capacity is great, but much less and limited for internal grinders, surface grinders, gear-cutters, automatic screw machines and numerous other types of machinery. First expansions in the war effort were usually privately financed by the machine builders, aided in a few instances by British funds.

Some capacity financed later by the DPC got into production too late for complete and sustained utilization of the plant and equipment; necessary revisions in the war program and other unforeseen factors account for some of this slack. An addition to a plant for the production of large lathes, 42-inch, got into operation only a few months before the demand for such units declined. Expansion in capacity for horizontal boring mills by one plant is another case in point. The end of the war, however, will find a substantial part of government-owned capacity centered in lathes and milling machines, although large enough for the production of other machine tools to cause concern as to final utilization. Option is given private operators to purchase the new facilities under DPC contracts, but in many instances uncertain factors ahead breed caution in taking title to the new plants.

Ordnance lists of tools are appearing frequently, containing machines available for current production needs. Relatively few can be worked in aircraft lines, which for the moment are hatching most new volume. Enough machines offered can, however, find an open spot to retard new buying and there is considerable shifting from plant to plant.

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LOVEJOY FLEXIBLE COUPLING CO., 4873 West Lake St., Chicago 44, Ill.

FINANCIAL

(*Concluded from Page 79*)

058, or $3.84 a share on the preferred stock.

Company states reduced earnings were due in large part to increased wage rates and higher costs of materials and supplies, while ore prices have remained frozen at the 1940 level. Late opening of navigation was also an important factor.

Pittsburgh Steel Earns $1,021,524 in First Half

First half net profit reported by Pittsburgh Steel Co., Pittsburgh, amounts to $1,021,524, equal to $6.28 a share on combined preferred stock. Profit for same 1942 period amounted to $1,377,175, or $8.51 a share.

June quarter net income totaled $421,403, compared with $600,121 in the initial three months and $731,840 for the June, 1942, quarter.

Eastern Rolling Mill Has Profit of $171,384

Eastern Rolling Mill Co., Baltimore, earned $48,158 in the June quarter, compared with $123,226 in the first period and $36,478 in the second quarter last year.

For the first half the company reports net profit of $171,384, equal to 81 cents on capital stock. In like 1942 period earnings were $175,405, or 83 cents a share. Profit for the 12 months period ended June 30 aggregated $469,141, against $400,423 in the preceding year.

Follansbee Steel Earns $442,936 in First Half

Follansbee Steel Corp., Pittsburgh, reports first half net income of $442,936, equal to $1.74 a common share. In like 1942 period company earned $202,976, or 64 cents a share.

Indicated second quarter earnings were $255,803, compared with $187,133 in the initial three months and $37,668 in corresponding quarter last year.

Magnesium Sellers Asked To Submit Price Proposals

Office of Price Aministration has asked sellers of magnesium or magnesium alloy ingot in special shapes to submit their proposed prices for approval where they cannot be produced at 1 cent per pound premium for non-standard shapes. Recent war demands have increased the need of special shapes which may require higher premiums.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Ameriean Radiator & Standard Sanitary Corp., Pittsburgh, $40,000 for additional facilities at a plant in Kentucky, making overall commitment $560,000.

Ford Motor Co., Dearborn,, Mich., $50,000 for additional facilities at a plant in Michigan, making overall commitment $86,850,000.

General Motors Corp., Detroit, $860,000 for additional facilities at plants in New Jersey, making overall commitment $8,000,000.

Whitney Blake Co., New Haven, Conn., $75,000 for additional facilities at a plant in Connecticut, making overall commitment $275,000.

Wyman-Gordon Co., Worcester, Mass., $260,000 for additional facilities at a plant in Massachusetts, making overall commitment $1,700,000.

Brunswick Balke Collender Co., Chicago, for plant facilities in Michigan, $500,000.

Bendix Aviation Corp., Baltimore, increase of $60,000 for facilities in Maryland, making overall commitment $660,000.

Jensen Machinery Co. Inc., Bloomfield, N. J., increase in contract $40,000 for additional equipment at plants in New Jersey and California, making overall commitment $185,000.

Chrysler Corp., Detroit, increase in contract $900,000 for additional equipment at plant in Michigan, making overall commitment $1,500,000.

Higgins Aircraft Inc., New Orleans, increase in contract $2,300,000 for additional equipment at plant in Louisiana, making overall commitment $26,000,000.

Transportation commission of city of Seattle, Wash., increase in contract $420,000 for additional transportation equipment, making overall commitment $550,000.

Ancor Corp., New York, $2,650,000 for plant facilities in South Carolina.

Monolith Portland Midwest Co., Los Angeles, $3,900,000 for plant facilities in Wyoming.

Western Electrochemical Co., Los Angeles, $300,000 for facilities in California.

Wickwire Spencer Steel Co., New York, $85,000 for equipment at a plant in Massachusetts.

Nash-Kelvinator Corp., Detroit, increase in contract $1,660,000 for facilities in Michigan, making overall commitment $34,000,000.

Reichhold Chemicals Inc., Detroit, 0450,000 for plant facilities in Michigan.

Andover Motors Corp., Elmira, N. Y., $70,000 for additional facilities for a plant in New York.

Singer Mfg. Co., New York, $1,125,000 for equipment at a plant in New Jersey.

United Electronics Co., Newark, N. J., increase of contract by $95,000 for additional facilities at a plant in New Jersey, making overall commitment $200,000.

Taft-Peirce Mfg. Co., Woonsocket, R. I., increase in contract by $25,000 for additional facilities at a plant in Rhode Island, making overall commitment $350,000.

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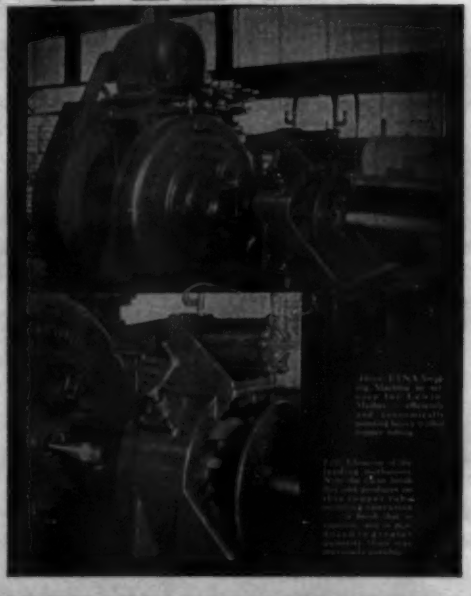
ETNA



They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

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CONSTRUCTION AND ENTERPRISE

OHIO

CLEVELAND—Lester Engineering Co., 2711 Church street, manufacturer of precision machines, is negotiating for lease of property at 3834 Prospect avenue, which will be altered for manufacturing purposes if zoning authorities permit.

CLEVELAND—Aircraft Fittings Co., 1390 East Thirtieth street, Arthur L. Bigelow, president, will build a chip house, 25 x 50 feet, to cost about $3500.

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HOTEL CLEVELAND Cleveland

CLEVELAND—Central Plastics Products Corp. has been incorporated to manufacture plastic materials by M. W. Johnson, 1012 Citizens building, as statutory agent.

CLEVELAND—National Advisory Committee on Aeronautics, care Edward R. Sharpe, administration manager, Cleveland Airport, is including a one-story 68 x 248-foot research building, office 30 x 300 feet and one-story barrel storage building 40 x 130 feet, in its expansion program.

CLEVELAND—Rod Cutting Co., Frank Mawcind, president, M. Caycy in charge of alterations, 9205 Detroit avenue, has leased a one-story building, 50 x 200 feet, at 1444 Hamilton avenue, and will alter for use as a machine shop.

CLEVELAND—Meters & Pumps Inc., Charles J. Bellar, president, 10700 Broadway, has been given permit for one-story factory building 26 x 59 and 18 x 19 feet, to cost about $4000.

PENNSYLVANIA

ERIE, PA.—American Sterilizer Co., 1230 Plum street, plans an addition to plant to cost about $10,000.

MICHIGAN

DETROIT—Utica Plastic Products Corp., 1006 Lafayette building, has been incorporated with $10,000 capital to manufacture dies and molds for plastic products, by Adrien Burtharme, 1661 Beaconsfield, Grosse Pointe Park, Mich.

TECUMSEH, MICH.—Bruse Casting Co. has been incorporated with $25,000 capital to operate a foundry business, by William J. Bruce, Tecumseh.

ILLINOIS

CHICAGO—Bethlehem Steel Co. has bought for future use a tract 300 x 345 feet on Eighty-third street 325 feet west of Wentworth avenue, adjoining its plant at 8301 South Stewart avenue.

CHICAGO—Sun Mfg. Co., 6323 North Avondale avenue, manufacturer of automotive testing equipment, is expanding its plant to provide facilities for manufacture of electric meters for war purposes.

CHICAGO—Cuneo Press Inc., 2240 South Grove street, printing house, has branched into ordnance work, altering a portion of its plant for changeover for large munitions output.

CHICAGO—Clearing Machine Corp., 6944 West Sixty-fifth street, manufacturer of heavy stamping and forging presses, has under way its third major expansion since beginning of defense program. A new type of forging machine is in heavy demand by ordnance manufacturers.

CHICAGO HEIGHTS, ILL.—Victor Chemical Works is building additional plant capacity to increase its war production.

MARYLAND

BALTIMORE—Chicago Bridge & Iron Co., Chicago, has contract for a butane sphere at Clinton and Cardiff streets for Standard Oil Co. of New Jersey, to cost $10,000.

TENNESSEE

CHATTANOOGA, TENN.—Combustion Engineering Co. is taking bids for a plant addition to cost about $100,000.

SOUTH CAROLINA

HARLEYVILLE, S. C.—Ancor Corp., 230 Park avenue, New York, is building a plant as agent for Defense Plant Corp. and will operate it. Plans call for production of 50 tons of calcined aluminum oxide per day, using process developed by associates of company from high alumina clay and limestone. Cost, including six miles of single railroad track, is estimated at $2,642,553.

FLORIDA

JACKSONVILLE, FLA.—Bureau of Yards and Docks, Navy Department, care Lieut. Claude B. Friday, naval air station, Jacksonville, has let contracts to Wright Construction Co., Columbus, Ga., for six magazines at Deland, Sanford and Lake City, Fla., at $49,000. Robert & Co., A. J. Cooper, manager, naval air station, engineers.

JACKSONVILLE, FLA.—United States engineers' office has let contract to Cleary Bros. Construction Co., West Palm Beach, Fla., for construction of magazines and other structures in Saint Lucie county, Florida, estimated to cost about $50,000.

IDAHO

POCATELLO, IDAHO—Contract for a $1,144,000 power and proof shop ordnance plant for the Navy has been awarded to C. F. Haglin & Sons, Missouri Valley Bridge & Iron Co., Sollitt Construction Co. and Winston Bros., Minneapolis.

OREGON

LEBANON, OREG.—Construction has been started on a dehydrating plant to be operated by Spencer Packing Co., C. B. Spencer, president, an existing building being remodeled for its occupancy.

PORTLAND, OREG.—G. L. Williams, purchasing agent, Spokane, Portland & Seattle railroad, has called bids for August 16 for 12 bay-window cabooses.

WASHINGTON

SEATTLE—Plant of American Foundry Co., 2944 First avenue South, was damaged by fire with loss of about $4000.

SEATTLE—Time Oil Co. plans oil storage plant at 2747 Commodore Way, including five 11,000-barrel steel tanks, three of 5225 barrels and two of 7851 barrels. Contract has been given to Ray & Earley.

CANADA

NIAGARA FALLS, ONT.—Lionite Abrasives Ltd., Stamford street, is receiving tenders through A. J. Burnell, 1280 Portage road, for construction of one-story, 40 x 60 foot addition to furnace building.

OSHAWA, ONT.—Fiberglas Canada Ltd., First avenue, plans plant addition and installation of new equipment to cost about $35,000.

ST. CATHARINES, ONT.—Packard Electric Co., 13 Race street, has given contract to Standard Steel Construction Co., Port Robinson, for steel work, and Herbert Morris Crane & Hoist Co. Ltd., Stanley street, Niagara Falls, crane contract, in connection with proposed addition to cost about $15,000.

TORONTO, ONT.—John Inglis Co. Ltd., 14 Strachan avenue, has given further contract to A. W. Robertson Ltd., 57 Bloor street West, for addition to plant to cost $40,000.

WELLAND, ONT.—Electro-Metallurgical Co. of Canada Ltd., has had plans prepared for plant addition to cost about $10,000, and plans further extensions to cost, with equipment, $26,500.

WESTON, ONT.—Moffatts Limited, 23 Denison road East, stoves, etc., has received tenders and will let contracts soon for plant addition to cost about $25,000. Prack & Prack, 36 James street South, Hamilton, Ont., are architects.

MONTREAL, QUE.—Montreal Bronze Ltd., 999 Delorimer avenue, has given general contract to Sutherland Construction Co. Ltd., 1440 St. Catharine street West, for addition to No. 2 foundry, to cost about $25,000.

MONTREAL, QUE.—Harrington Tool & Die Co. Ltd., is receiving tenders through Grattan D. Thompson, architect, 2049 McGill College avenue, for construction of plant addition at Lachine works to cost about $30,000.

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Three—7½" x 27" Libby Type C Turret Lathes, M.D.
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Two—4¼" x 22" Libby Type B Turret Lathes, M.D.
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DI

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(RIGHT) Roof arch of an end-fired, down-draft, periodic kiln in process of construction at the Eureka Fire Brick Works, Mount Braddock, Pennsylvania. Placing Refractory Concrete at crown of center section.

(LEFT) Center board removed. Note key left by cleat on center strip at top of arch. The only joints in this arch are the two construction joints at the third points and one lengthwise at the crown.

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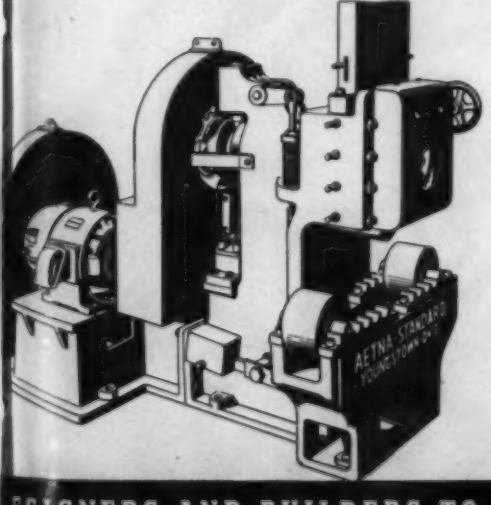

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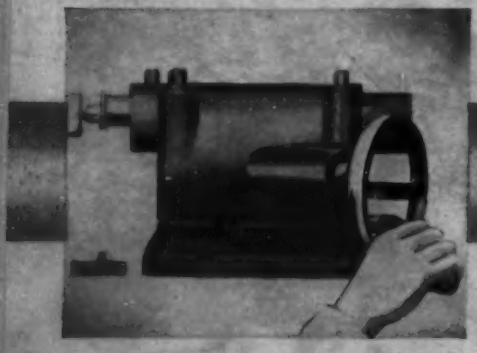
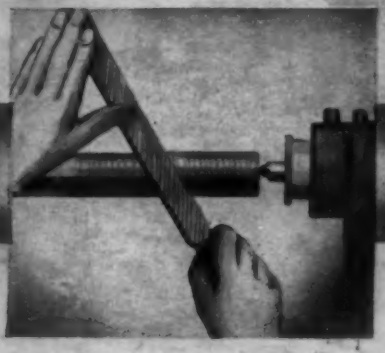
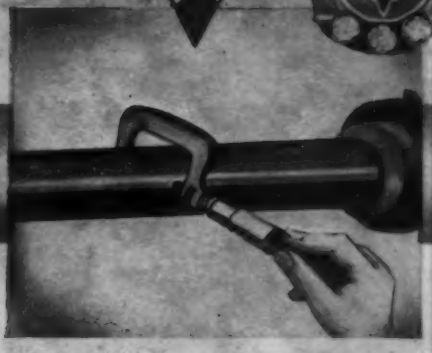


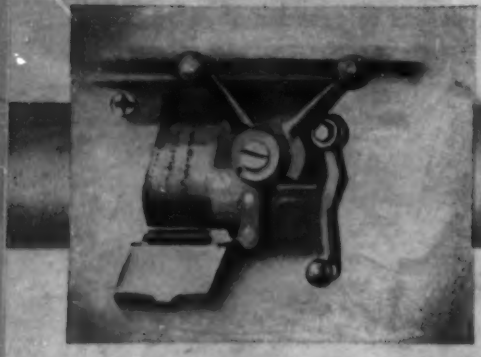
With work set up on headstock center, run tail center up tight, then slack off slightly and start lathe to run at twice finish turning speed, adjusting center to allow dog to click in face plate but not to allow rattle or end shake.



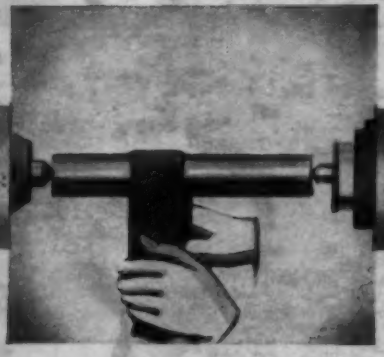
Use a 12-inch mill file with slow, even strokes, lapping from side to side. Use a long, slow forward stroke and press firmly and evenly on the revolving piece being filed. Relieve pressure on return stroke.



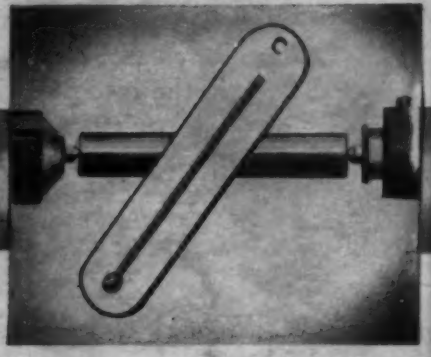
Stop lathe and try diameter with micrometer frequently until whole surface is filed as straight and smooth as possible. Leave from five to eight ten-thousandths (.0005 to .0008) of an inch for polishing the work.



For polishing work that is well-balanced, set change levers to give the highest possible speed. On unbalanced work, run the lathe at highest speed possible without vibration. A speed lathe is best for straight shafts one inch or less in diameter.



Use strip of emery or carborundum paper of fine grade and press against work, moving abrasive cloth from side to side to cross lines and bring work to rough polish without cutting rings. Use very fine abrasive cloth and oil on work for final polish.



Watch out for heat! Remember, polishing and filing heat the work. When measuring with a micrometer, either cool the work by immersing in water or else make an allowance of one or two ten-thousandths of an inch for cooling of work.

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